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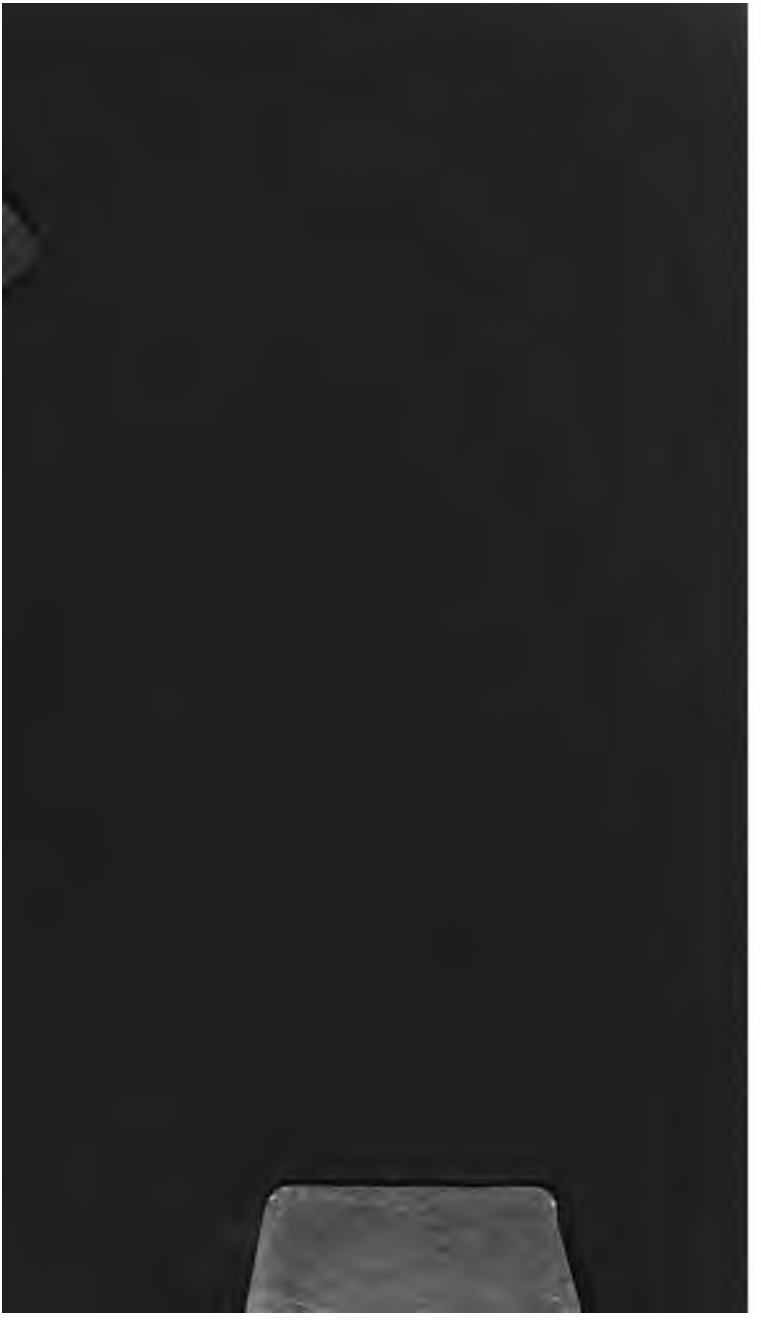

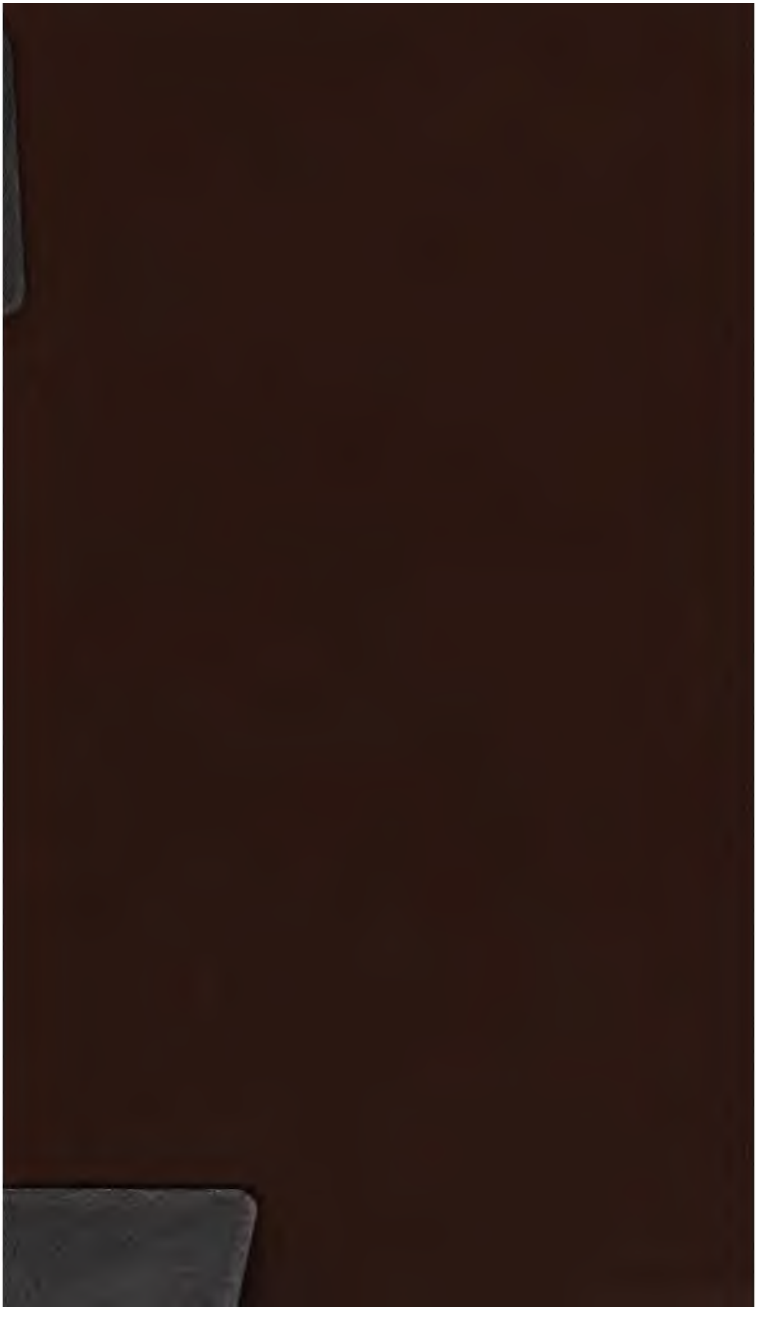

OPINIONS OF THE PRESS.

"A very neat little volume, entitled a 'New Path in Electrical Therapeutics,' by Elizabeth J. French, and handsomely printed and published by J. B. Lippincott & Co., Philadelphia. Its object is to describe and vindicate Mrs. French's great discovery of electrical cranial diagnosis, and a scientific application of nine different currents of electricity to the cure of disease. The style is clear, concise and easy, showing that the heart of the authoress is in the subject, and the authorities cited in support of her position are respectable and numerous."—*The Press.*

"The book is written in an easy, graceful style, and contains much of historical and scientific information upon the subject of Therapeutics. It is also valuable as a curiosity of scientific investigation."—*The Commonwealth, Boston.*

"The work is written in an easy and comprehensive style, and is really curious and interesting."—*Philadelphia Inquirer.*

"The author evidently has a very clear idea of her subject, and though her theory is rather astounding, still, being supported by such an eminent authority as Dr. Ferrier, and by a successful practice in cases described in the volume before us, can hardly fail to attract attention from the best scientific minds."—*The Times and Messenger, New York.*

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"Dr. Ferrier, the London scientist, is somewhat late in making public his supposition that 'disease is mapped out on the brain, and may be diagnosed.' In a recent work on Electrical Therapeutics, by Elizabeth J. French, the scientific application of electricity reveals a new and wonderful phase in anthropology. 'It is many years since I discovered the human brain is a chart upon which may be found delineated all the organs of the human body, and a record of their exact conditions.' Our American lady should be sustained, and the laurels should be hers."—*Fort Wayne Sentinel.*

"Those who sneer at the idea of cranial diagnosis, as developed by Mrs. French, may perhaps have more faith in it, now that it has been *adopted*, not *discovered*, by a great English scientist."—*Sunday Republic, Philadelphia.*

"In this startling treatise the lady proclaims that not only has she practiced, but that she teaches, the science of diagnosing disease through the brain. The lady's claims are no bolder than she seems prepared to substantiate; and just now comes the announcement that Dr. Ferrier, of King's College, London, England, is about to make public his experiments on the same subject. The lady has won the emoluments of fame by her early penetration, and whilst Dr. Ferrier stands at the portal of discovery, Dr. French has almost perfected a grand science. If this be charlatanism and humbuggery, let us seek to expose it by stern and rigorous investigation, but until then let her who has won wear the laurels."—*Garrett County Gazette.*

"Professor French in her new work gives a very full account of her great discovery respecting electrical cranial diagnosis and the scientific application of nine different currents of electricity to the cure of disease. It gives a thorough system of hygiene, and one of the most consistent we ever read. However much may be said against her electrical panacea as an hallucination or otherwise, she has wrought wonderful cures in chronic and physician-abandoned cases. Happily, there is no check of potency to the progress of science."—*Ohio Farmer.*

OPINIONS OF THE PRESS. (*Continued.*)

"'A New Path in Electric Therapeutics,' is the title of one of Prof. Elizabeth J. French's books, and conveys somewhat of the contents of the volume. It has received the highest endorsements of the press, and evidently all claims to originality in treating diseases are perfectly substantiated. It is written in a clear, easy style that is pleasing and interesting to follow."—*Indianapolis Sentinel.*

"This interesting and instructive book, which gives a clear and lucid account of Prof. French's great discovery of electro-cranial diagnosis, and the scientific application of electricity to the cure of disease, should be perused with care. The reader will find it a condensed but complete manual of anatomy and physiology."—*Augusta Daily Kennebec Journal.*

"A work of great value, not only to the scientific world, but also to the great body of suffering humanity. Dr. French has made wonderful discoveries in the medical application of electricity, and written this work in support of her theory. She is so eminent a member of the army of progressive women that we propose to give a sketch of her in our woman's department next week."—*Sunday Leader, Philadelphia.*

"This work embraces a thorough system of hygiene, and presents plain directions for the treatment of diseases by the author's system of electrical applications. It claims to be a complete manual of anatomy and physiology, and gives in addition an historical sketch of the discoveries of magnetism and electricity, the progress of medical science, and brief sketches of the lives of eminent practitioners from the earliest ages to the present century. It is a book that should be in the hands of every thoughtful person."—*Union and Advertiser, Rochester.*

"Probably no branch of science is so full of differences of opinion or downright quarreling over ideas as that of medicine. The author of this valuable work claims that, under her method of its application, electricity becomes a remedial agent more exact in its laws and workings than any other known to medical science; that the laws which govern electric forces are as stringent, yet as comprehensible in medical treatment, as in the working of the magnetic telegraph; that through its aid the power to give invariably correct diagnoses has been attained by her, and may be acquired by any one else who will give it study. This last we are fain to believe one of the most remarkable and valuable of scientific discoveries. The art or power of detecting and locating the seat of disease by cranial diagnosis is based upon the theory that the human brain is a chart upon which may be found delineated all the organs of the body, and with them a correct and comprehensible record of the exact condition in which they exist. That this theory conflicts with the notions of many high authorities in anatomical and medical science is quite probable; however that may be, its truth in actual practice has been satisfactorily demonstrated in the presence of the writer. If not susceptible of scientific explanation, as its author freely claims, then it is a most wonderful phenomenon —a revelation from the great unseen before which science must bow in humble submission."—*North-Western Lumberman, Chicago.*

Elizabeth J. Krenek

A NEW PATH

IN

ELECTRICAL THERAPEUTICS:

AN ACCOUNT OF

PROF. ELIZABETH J. FRENCH'S GREAT DISCOVERY

OF

ELECTRICAL CRANIAL DIAGNOSIS,

AND THE SCIENTIFIC APPLICATION OF

TEN DIFFERENT CURRENTS OF ELECTRICITY

TO THE CURE OF DISEASE.

A COMPLETE MANUAL OF ANATOMY AND PHYSIOLOGY.

AN HISTORICAL ACCOUNT OF THE DISCOVERIES IN MAGNETISM AND ELECTRICITY, THE PROGRESS OF MEDICAL SCIENCE, AND BRIEF SKETCHES OF THE LIVES OF EMINENT PRACTITIONERS, FROM THE EARLIEST AGES TO THE PRESENT CENTURY;

ALSO

A THOROUGH SYSTEM OF HYGIENE;

TO WHICH ARE ADDED PLAIN DIRECTIONS FOR THE TREATMENT OF DISEASE BY PROF. FRENCH'S SYSTEM OF ELECTRICAL APPLICATIONS.

BY

ELIZABETH J. FRENCH.

"Witness that she who did these things was born to do them; claims her license in her work."

FOURTH EDITION.

PHILADELPHIA

J. B. LIPPINCOTT & CO.

1877.

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A NEW PATH

IN

ELECTRICAL THERAPEUTICS.

CHAPTER I.

INTRODUCTORY.

After twenty-five years of arduous study and industrious research into the principles of medical electricity, together with a vast range of practical experience in the results of its application as a therapeutic agent, I feel it a duty incumbent upon me to give those results to the world, and to announce that I am able to prove, both in theory and practice, that electricity scientifically applied is the safest, most reliable, and most universally beneficial of all curative systems yet known to mankind.

I have frequently been urged by those who have been cured by my treatments, or others who have listened with interest to the announcement that the clue was found which would enable the medical faculty to wield the mysterious force of electricity with all the precision of an exact science, to publish the records of my experience and share this valuable discovery with those who would be equally interested in it with

myself; but not until time has ripened opinions into knowledge, and deepened experiments into certainties, could I be induced to challenge the preconceived opinions of the world on the vague character of electricity as a curative agent, and affirm unhesitatingly that medical electricity can be understood and applied as a science, far more exact in its laws and workings than any other remedial agent now in practice.

This stand-point, however, I may now venture to say, I have attained. I know that the laws which govern electrical forces are as stringent, yet as comprehensible in medical treatment, as in the working of the magnetic telegraph. I claim to have attained to some knowledge of those laws, and to have gained a correct, though of course only limited understanding, of how to apply them for the cure of disease.

I claim to have demonstrated the pernicious, and even fatal, error of using electricity in unscientific methods; and, on the other hand, I am prepared with an army of living witnesses to prove the astounding successes which ensue from the application of this force, when regulated by the subtle powers which I find resident in the different currents evolved from carefully constructed batteries. Another result still more remarkable, namely, the power to give invariably correct diagnoses of disease, has opened up in my path of discovery, thus revealing all the hidden mysteries of the human organism to the searching eyes of science. The day of half-formed speculations, doubtful guesses, and merely symptomatic indications is at an end. The assumptions of half-lucid ignorance and half-enlightened somnambulism fade away into the land of

dreams, from whence so many of such revelations have originated, and science, with all the nobility of simple fact, ungarbled truth, and demonstrable principles, arises to illuminate the realms of speculation, and elevate the system of therapeutics to the very same pedestal occupied by pure mathematics.

Ninety-three years ago, Friedrich Anton Mesmer, whilst still laboring to evolve the doctrine of a universal magnetic force existing throughout the universe, published twenty-seven aphorisms, in which are the following remarkable views of the possibilities which electricity and magnetism might yet open up to the physician. Mesmer says:

"No. 8. In human bodies are discovered properties which correspond with those of the magnet. Also various opposite poles may be distinguished, which can be imparted, changed, disturbed, and strengthened."

"No. 22. From instances deduced from my firmly-established and thoroughly-proved rules, it will be easily perceived that this principle *can immediately cure diseases of the nerves.*"

"No. 23. Through its assistance the physician receives much light regarding the application of medicaments, whereby he can improve their operation, call forth more beneficial crises, and conduct them in such wise as to become master of them."

"No. 25. Through this knowledge the physician will be enabled to judge of the origin, progress, and nature even of the most intricate diseases, and bring about a cure without exposing his patient to dangerous effects and painful consequences, whatever be the age, sex, or temperament of the patient."

"No. 27. The doctrine will, at length, place the physician in such a position that he will be able to judge the degrees of health possessed by any man, and be able to protect him from the disease to which he may be exposed. The art of healing will by this means attain to its greatest height of perfection."

The day of realization for these bold and, at that time, apparently transcendental aphorisms has now dawned.

If I can justify my claim to have fulfilled, not in one but in scores of instances, the possibilities promised by the Viennese doctor,—if I can prove that the science whereon my system is founded can be reduced to mathematical laws taught with unfailing precision, entered upon the page of stern scholarship, and take its rank among the fundamental laws which underlie creation,—I can no longer withhold the great discovery from the world, nor keep back from public investigation the results which my twenty-five years' labors have achieved.

As I cannot in this treatise show the varieties of forms in which electrical diagnoses and treatments of diseases operate, I must urge upon my readers to peruse attentively the few cases which I have selected from hundreds of others in verification of the stupendous curative powers which I claim for my system.

The evidence of many authentic writers assures us that the practice of healing by means of magnetism was in use among the ancients, who applied it as a part of their most sacred mysteries.

Among the ancient Persians, Hindoos, Greeks, and Romans, many evidences exist that the priests under-

stood and applied the forces of the magnet in aid of their religious services. Their chief methods of healing the sick were conducted through the practices of animal magnetism, strengthened by the influence evolved from magnetic stones, crystals, etc. Their temple sleep, ablutions, and purifications were only adjuncts to the curative powers evolved from magnets, and it is now understood that the twin deities Castor and Pollux, who performed such a prominent part in heathen mythology, were symbolical impersonations of the opposing yet correlative polarities found in the magnet.

During the Middle Ages, magnetic arts seem to have been lost, or only practiced incidentally; but in the eighteenth century they were revived by Mesmer, a physician, born at Meersburg, Suabia, in 1734, and who was said to have learned them from Maximilian Hell, a professor of astronomy in Vienna.

Mesmer first attracted public attention by a remarkable thesis upon planetary influence; in which he contended that the planets were the centres of an all-pervading fluid, which, transmitted through the atmosphere to the earth, affected plants, animals, and human beings. From this point he extended his theory until he taught that the forces evolved from batteries, magnets, and human organisms could be made available in the cure of disease; and in this form he termed their operations "animal magnetism."

Proceeding to Paris, Mesmer succeeded in forming a sort of stock company, in which some of his admiring followers invested large sums, and by aid of which he was enabled to hire an elegant mansion in the Place

Vendôme and give demonstrations of his art surrounded with all the attractions of luxury and fashion. The members of his society were to be instructed in the marvels of his science; and, as he succeeded in effecting many remarkable cures, it is no wonder that he soon achieved a high reputation for his mysterious acquirements no less than for his skill as an accomplished physician. Dr. Anton Mesmer became the fashionable sensation.

His *séances* attracted the highest nobles of the land; even Queen Marie Antoinette became a patroness of the new therapeutic philosophy, and his *salon* was crowded with great lords and fair ladies, all eager to become participants in the marvels of his practice.

His custom was to receive his patients in a magnificently furnished apartment, in which the sound of distant music and the influence of a soft light, subdued by hangings of the choicest hues and texture, contributed to impress the senses with a mystic and fascinating influence. A vat or tub was placed in the centre of the *salon*, filled with magnets, metallic rods, and other substances deemed at that time useful in the elimination of the magic electrical flow, and this vat was so arranged that conducting rods were carried from the main battery to each of the parties to be operated upon. Mesmer's early method of practice and their results have been so often described by various authors that it is only necessary to add that the magnetic currents arising from the "*baquet*," combining doubtless with the delicious sounds of music, the mysterious gloom of the apartment, and the striking effects of the operator's presence and influence, all contributed to produce strange and

often curative results upon the temperaments of those assembled.

Mesmer's practice was in the first years of his discovery undoubtedly more experimental than purely scientific. The results too of his curious combinations of mechanical and psychological appliances tended to weaken his claims for acceptance on scientists; still, he produced effects in the cure of disease far too obvious and striking to be overlooked, or to merit contemptuous denial from any mind capable of appreciating the indications which lead into untrodden paths of science.

Dr. Anton Mesmer, whose methods had already interested the king and queen of France, was advised by his majesty, himself the President of the French Academy of Sciences, to lay the results of his observations upon the existence of a universal fluid and its application to curative purposes before that distinguished body of *savants*, whose office it was to investigate all scientific subjects. The result of this application (made, as has been above stated, at the suggestion of King Louis XVI.) was not only adverse to the propositions of Mesmer, but, by the contemptuous tone in which the report of the academicians was given, it was supposed the doctor's claims to scientific appreciation would be forever quenched and his doctrines exploded. History has sufficiently demonstrated that the real assumptions of ignorance in this case, like that of thousands of others, might with much more force have been applied to the self-styled scientists than to the ill-appreciated discoverer.

Mesmer's theory was not exploded by the arrogant

criticisms of the Academy. His practice continued to produce results fruitful for good in many parts of the continent of Europe besides Paris; and though he subsequently suffered much from the world's ingratitude and died at a very advanced age in extreme obscurity, his doctrines were kept alive by numerous enthusiastic followers, and still continue to offer foundation-stones for the many splendid superstructures of new truths in physics, which the world of forces is opening up to us.

It may not be amiss here to insert, for the benefit of those who intrust all matters of opinion to the keeping of scientific bodies and graduates of old and well-beaten paths, the comments of Dr. Justinus Kerner, the celebrated German scientist, and author of a fine biographical sketch of Mesmer, when remarking upon the action of the French Academy of Sciences in rejecting the doctrine of animal magnetism. Dr. Kerner says:

"It must be remembered that the same Academy rejected Franklin's discovery of the lightning-conductor, and Jenner's discovery of cow-pox. When the first model of a steamship was presented to the Emperor Napoleon, he desired the Academy to test the value of this discovery, and hereupon the wisdom of the academicians led them to declare the invention to be wholly impracticable and the idea untenable. At a later period the French emperor was heard to declare, 'How foolish I was not to have relied on my own simple understanding, rather than upon the opinions of learning masked by prejudice and blinded by *scientific* bigotry!' To this conclusion I think every

advocate of new truths, and every disciple of progress in scientific unfoldments, will devoutly cry amen!"

In 1786 Galvani discovered and announced the existence of *animal* electricity. He was bitterly opposed by Volta, and sustained by Humboldt; but it was not until Prof. Carlo Matteucci had added the weight of his evidence that Galvani's theory was admitted to be correct.

Finally, Dubois-Reymond established the fact that "the muscles and nerves, including the brain and spinal cord, are endowed during life with an electromotive power, which acts according to a definite law."

In 1831 this question came before the Royal Academy of Medicine in Paris, when a committee decided in favor of the claims of animal magnetism. This committee comprised nine of the most distinguished men in France, and its decision gave at once a strong impetus to the new science. Its study and practice extended into Great Britain and America, and it was adopted and advocated by such men as Von Reichenbach, Dr. Elliotson, Dr. Gregory, Dr. Ashburner, and a few gentlemen of equally high standing in their profession, who not only advocated the use of electricity but adopted it in their own practice.

While Mesmer and others were operating in animal magnetism, Mons. Jallabert had succeeded in affecting a case of paralysis favorably. Still later, Abbé Sans and Sigaud de la Fond were operating successfully in paralytic cases. In fact, it began to be generally conceded that electricity might be made useful in conditions of paralysis, nervous affections, or disturbed circulation.

Attempts were made to use the Leyden-jar in medical treatments, but its effects proved rather injurious than otherwise, from the severity of the shock it occasioned. As early as 1803 certain appliances began to come into use, which showed that the new practice was gaining ground; these were metallic brushes with insulated handles.

The idea of galvanism or electricity eliminated from a battery and applied to medical uses, originated in the experiments of Humboldt on the muscular and nervous fibres; but Aldini, the pupil of Galvani, was the first who made this branch of the subject a matter of special study, and who published his conclusions to the world. This he did in Bologna, in 1804, in a work entitled "Theoretical and Experimental Essay on Galvanism."

A few years later we find gout, rheumatism, and nervous affections being treated by electricity, its application to the dispersion of tumors and aneurisms, through the medium of needles connected with a battery, beginning to find considerable favor. By the year 1828 public interest in the medical uses of electricity amounted to enthusiasm, and numerous treatises upon the subject appeared in France, where it was more especially being investigated.

In nervous affections, and even in derangements of the sight, its power as a remedial agent was acknowledged to be remarkably manifest.

It was finally adjudged by a large majority of one Continental faculty that "whilst electricity could not be considered as an actual specific, yet its power as a remedial agent rendered it a most important adjunct in the treatment of certain diseases."

Under the influence of this authoritative admission, the popularity of electrical treatment soon spread through Italy, Germany, and England. It has also been introduced into several public hospitals, besides entering largely into private practice.

Whatever the ultimate combination of forces may be which produces in animated beings the result so vaguely called the "life principle," I claim that there is in the human system a sufficient number of phenomena accompanying nervous and muscular action to demonstrate that the said "life principle" is something analogous to electricity, and that this force properly distributed throughout the system maintains it in health, and when disturbed results in disease.

As the electric forces of the human system are simply modifications of those which vitalize nature at large, it follows that any excess or diminution in their quantity, or any impoverishment in quality, may be supplied by a judicious administration of the electric battery.

It is upon this basis that my system of *electrical therapeutics* operates. I may, in fact, state here that my theory of the electrical force in its connection with the human organism, recognizes it as the actual life principle.

Also, I assume that the human organism in a healthy condition contains just so much, and no more, of this fluid as suffices to maintain it in its highest condition; whilst any loss or disturbance of the normal quantity of electricity involves a derangement not only in the flow of that fluid, but in all the motions and functions of the body, and that this derangement is disease.

Any undue determination of this fluid to any specific point not only disturbs the equilibrium of the whole organism, but produces (when that determination occurs) a morbid condition. I consider that examples of this may be found in the forms of disease called pleurisy, pneumonia, neuralgia, tic-douloureux, inflammatory rheumatism, softening of the brain, etc.

In these cases there is an excess of the electric fluid in some special direction, owing to the proper channels for its passage having become clogged, or to its having been improperly diverted from its natural course. The result is inevitably a morbid and congested condition in the part affected.

Of course the primary object in such cases is to renew the normal flow of electricity through the system, either by removing the obstructions in its path, or by opening other channels for its passage.

Where there is any lack or diminution of the electric currents, there is a corresponding loss of vital power: as in paralysis, torpid action of the liver, kidneys, or bladder, etc. In such cases the normal condition can only be restored by stimulating the flow of the electric fluid.

In disordered circulation, sluggish action of the blood, etc., the electricity is wanting, the vitality gone, and until this is restored the circulation remains in an unhealthy condition.

Such an application as I am in the habit of making in these cases is always followed by renewed action in the circulation, and by such sensations in the deadened parts as announce the influence of the vitalizing electric currents.

From the success which attended my first treatments of nervous disorders by electricity, as far back as twenty-five years ago, I was induced to apply it to other diseases, and I have found it more or less efficacious in treating all forms of suffering. In fact, I have found in hundreds of instances its superiority over every other mode of remedial art.

Unfortunate or unsuccessful results of the electrical treatment may, in all cases, be attributed to faulty methods in the treatment itself, and to ignorance or an improper understanding of the laws which govern the circulation of this fluid, and which should control and direct its administration.

I was led to the adoption of the vapor-bath as a medium for the administration of electricity after thoroughly testing the *dry* application and the use of *water-baths*, by finding the first less effective and the latter often injurious. I accordingly adopted the use of the vapor-bath, and, in 1854, first established this method of treatment in New York.

At that time it was generally believed by medical men that the application of electricity in a temperature of more than 100° Fahrenheit would endanger life.

Believing that this theory was a fallacy, I made the experiment before Drs. Massey and Page at a temperature of 135° Fahrenheit, the result of the experiment being to prove that my theory of the safety of such applications was entirely correct. Since then I have applied electricity in a case of cholera, at a temperature of 145° Fahrenheit, using the strongest battery then known, and applying a current now denominated by Dr. Kidder "A. D.,—Diffusive Sensational." It

is my usual practice, however, to apply the fluid in a temperature ranging from 100° to 110° Fahrenheit.

It has been at length conceded, even by the medical faculty, that the use of electricity is particularly available in the treatment of nervous disorders,—that is to say, *in the special conditions of derangement*, which the faculty have never been able to deal with successfully in any other way; but I insist that I have yet to meet with *any disease*, organic or functional, hereditary or contagious, which I have not been able to affect satisfactorily by the judicious application of this fluid.

I may perhaps better define my own impressions on this subject by drawing an analogy which has often occurred to me.

I would liken the human organism not to a magnet, which has been often done, but to a great natural battery, of which the lungs are the magnets, generating the electricity for the whole organism; the nerves, the wires or conductors; the heart, the helix or intensifying factor; the head and feet answering to the positive and negative poles. Conceive that the lungs generate the fluid from the oxygen of the atmosphere, and we have at once a never-failing electric reservoir, in which the slightest perturbation in the current produces, as is well known, a corresponding disturbance in the electric condition of the body.

With this view, and believing that the character of the fluid undergoes an important and refining change in its progress through the human battery, the marvelous and otherwise inexplicable phenomena of animal magnetism seem to me not only entirely worthy of credence, but to be explicable under purely natural laws.

The sympathy which must exist between all the modifications of this fluid and nature, is in itself a sufficient explanation of many of Von Reichenbach's most extraordinary experiments; while this same sympathy is equally explanatory of the extraordinary success which follows its application in cases of disease which might else be well termed "incurable."

Believing in the divinely ordained "correlation of forces" in all departments of life and being, I see no reason for leaving out of this grand category of motor powers the correlative of the life principle in man, or vital electricity.

CHAPTER II.

THE HUMAN ORGANISM ANATOMICALLY AND PHYSIOLOGICALLY CONSIDERED.

A GENERAL review of the standard works put forth with the avowed aim of instructing the world in the very profound yet essential details of self-knowledge, would impress the unscientific reader with the belief that the writers had purposely veiled the whole subject behind a mask of technical mystery which it was neither possible nor desirable to penetrate. A general knowledge of the human structure, and a certain amount of information concerning the workings of that machinery which constitutes life and being, should certainly be recognized as an essential feature in the education of every reasonable being; but in order to arrive at even the simplest details of the physiology of common life, the student seems compelled to wade through such a mass of technical nomenclature, and burden the memory with such an array of unpronounceable phraseology, that the study seems to be intrenched behind the breastwork of professional monopoly, and unprofessional men and women find the jargon of the dissecting-room, or the incomprehensible literature of medical pedantry, erecting insuperable barriers against the most superficial understanding of their own sublime and wonderful organisms.

Realizing the importance of a general understanding of the human structure, the subtle workings and occult powers of which will form the principal theme of this volume, I feel it necessary to preface the statement of my views concerning the best methods of cure, by a plain and comprehensible definition of what that organism is upon which I propose to operate; and, in order to gain the most comprehensive possible view of our subject, we shall assume that we are addressing unscientific readers, and those who will follow us through such details as will afford them a wide range of ideas without the trouble of searching for them in endless labyrinths of words.

An organism is a body composed of separate parts called organs. It is definite in form and function, and each part or organ is necessary to the full perfection of the whole structure. Unorganized matter, on the contrary, is not necessarily made up of separate parts; it does not consist of organs, nor are the sizes and forms of inorganic masses limited or definite, except in respect to crystalline formations, which are always definite. Inorganic substances, such as minerals, earths, fluids, gases, etc., may be unlimited in size, and heterogeneous in the shape of their several masses, but plants and animals always assume certain definite shapes and sizes, ranging within certain normal limits. You may break up and divide inorganic bodies into any number of subdivisions, and each part shall retain its identity and be still the same substance; but you cannot take from an organized body any portion, however minute, without damaging its integrity and depriving it of an essential part of its structure.

The study of anatomy deals with and describes dead matter. Physiology treats of the powers, motions, and functions of living bodies. Physiology also includes a survey of all animated structures, from the simplest forms of the vegetable to the highest conditions of animal existence; but as the human structure may be regarded as a microcosm, including every form of life below itself, so the study of man is the most instructive and comprehensive of all other branches.

The human organism is made up of matter and force,—matter in its three states of solid, fluid, and gaseous, and force, including all the various forms of motion, the sum of which we call life.

The fluids in animal bodies exist chiefly in the form of chyme, chyle, lymph, blood, the different juices secreted by special glands, and water.

The solid portions are called tissues, and consist of bone, muscle, cartilage, membrane, adipose, cellular and areolar tissues, nervous matter, hair, teeth, and nails.

The fluids contain in solution all the materials for the formation of solids, and as the fluids and solids are mutually convertible, and constantly interchanging states, their constituent elements do not differ materially from each other.

The following elements are found in more or less variable proportions in the human system: oxygen, hydrogen, nitrogen, carbon, sulphur, phosphorus, silicon, chlorine, fluorine, and iron. There are other elements occasionally found in the body, such as manganesium, aluminum, and copper, but these are rather incidental than constant in their presence.

There are, without reckoning the teeth, about two hundred and eight pieces of bone, arranged for the most part in pairs, and grouped symmetrically on either side of the body. The bony structure may be divided into the cranium inclosing the brain, the bones of the face, the trunk, including the sternum, vertebræ, twelve pairs of ribs, the collar-bones and shoulder-blades, and the pelvis, which supports the abdominal regions. The lower extremities consist of the thigh- and knee-bones, the legs, feet, and toes. The upper extremities include the arms, hands, and fingers.

The cranium incloses the brain and its appropriate system of blood-vessels, and also bounds the face, organs of special sense, and cranial nerves. The thorax and vertebræ inclose the heart, lungs, blood-vessels, and spinal cord. The pelvic basin supports the stomach, liver, pancreas, spleen, bladder, intestines, and organs of generation. Thus the bony structure performs the important office of protecting, as in an inclosed lattice-work, the vital organs. There are certain pieces of bone in the pelvis, face, head, and spine which are single and uniform; all the rest are arranged, like the extremities, in pairs, on either side of the body. Each pair of bones differs in some respects from every other pair, and all are fastened together by joints, called articulations. The cranium is not formed of one compact mass, but consists of several pieces, firmly united by the interlocking of notched edges, called sutures. The long bones of the extremities are hard, hollow cylinders, lined with membrane, on which blood-vessels are distributed for the nutriment of their substance. The long bones are ex-

panded at the extremities, so as to present surfaces for articulation with other bones. Some of these bones are united by a ball and socket, others by flat surfaces, but all are firmly bound together by muscles and ligaments, and the end of each bone is covered with a layer of cartilage, lubricated by means of a sac of serous membrane, which effuses a peculiar fluid, called synovia, the use of which is to keep the joints moist and supple.

The bones are composed in the first place of cartilage, which is converted into osseous tissue by the deposition of phosphate and carbonate of lime. In infancy, cartilaginous or animal matter constitutes the chief portion of the skeleton; in adults, the lime increases, hardening the bones, and communicating strength to the frame; in old age, however, the animal matter dissipates so rapidly that the bones become exceedingly brittle, and hence it is that fractures to persons in advanced life are so dangerous and difficult to repair.

Without entering into the minutiæ of detail which belongs to the anatomy of the bones, it is enough to call attention to the beautiful mechanism of which the frame-work is composed, the position it occupies in the human economy, and to note how admirably the finest principles of mechanics are carried out in the articulation of the several joints, and the freedom with which every part of the structure moves.

The respiratory apparatus commences with the mouth, which conducts the inhaled air through the trachea (windpipe) into the lungs. The trachea is a strong, highly elastic tube, composed of muscular, fibrous, and

mucous membrane, all of which line and connect about eighteen cartilaginous rings, the contractile action of which is admirably adapted to produce the various inflexions of the voice essential in speaking or singing.

We may here pause to remark that all portions of the viscera or internal organs that are exposed to the air are lined with mucous membrane, and all the internal organs themselves are inclosed in sacs of serous membrane, the office of which is to secrete a watery fluid, called serum. It is by the effusion of serum that the various organs are lubricated, and any undue irritation from their friction one upon the other is avoided.

The trachea terminates, as it enters the thorax, in two arches, called bronchi, and these, dividing off into the right and the left lung, subdivide and ramify into an immense system of tubing, every fibre of which ends in a minute air-cell. The tissue of the lungs is composed of fine areolar membrane, air-cells, bronchial tubing, arteries, veins, and capillaries. The air-cells are composed of microscopic sacs of membrane. The bronchial tubes, veins, arteries, and capillaries of the lungs are all attenuated to the utmost degree of fineness, and so profusely distributed that the entire mass of the lungs may be said to consist of an immense surface of membrane, with blood-vessels on one side and air-cells on the other. The blood and air do not come into contact, although the fine and permeable character of the membrane permits the nutritive quality of the blood to pass into and nourish the air-cells, and the vitalizing properties of the inhaled air to act upon and change materially the character of the blood. It

has been estimated that there are at least six hundred millions of air-cells in the lungs, each one of which is supplied by an artery communicating with a vein, and inflated by the air inhaled in the act of inspiration. The surface presented by the membrane of the lungs would, it is supposed, cover more than thirty times that of the whole body, and the capacity for inflating this light, spongy tissue is provided for, first, by the elastic intercostal muscles which connect the ribs together and expand with every respiration, and next by the action of the large muscular membrane called the diaphragm, which separates the thorax from the abdomen, and alternately curves upwards and downwards with the actions of inspiration and exhalation performed by the lungs. The chief function of the respiratory organs is that of aerating the blood which is carried into the lung-tissues by the pulmonary artery from the right ventricle of the heart. At this point the blood is finally collected by the veins from all portions of the system, and, being charged with the impurities and effete matters gathered up in traversing the body, presents the appearance of a dark purple, almost black, fluid when poured through the right vena cava or large vein into the heart.

By the exposure of the venous blood to the oxygen of the atmosphere inhaled through the lungs, its impurities are in part disengaged and given off in the form of carbonic acid gas; the whole mass of blood, or nearly the whole, becomes changed in tone and color; the dark purple hue is converted into a bright scarlet, and by the time the pulmonary circulation is completed, the blood is arterialized and poured back into

the heart through the left auricle, in a condition sufficiently renovated to form pabulum for the support and nourishment of the entire system.

We must now trace in more detail the circulatory process, and note the intimate connection and interdependence which it maintains with the respiratory system. The heart is the centre of the circulatory apparatus, and it is situated in the thorax, between the right and left lungs. The point or apex slants forwards towards the left lung, on which it slightly impinges, the base or broad part inclining backwards and upwards towards the right shoulder. Although the formation of muscular fibre is uniform in all parts of the system, the closely-knit and strongly-packed fibres of the heart constitute it the most powerful muscle of the whole body. It is protected from friction against other organs by a smooth serous membrane or sac containing cardiacal fluid, and this sac is spread over the whole surface of the heart, and so doubled on itself as to form a closed bag, called the pericardium, or heart-case.

The heart itself is divided internally in the direction of its length into two halves, which, though so closely connected as to form one, constitute it in reality a double organ. Each part also being called upon to perform different functions from the other, the walls of each side differ in thickness in proportion to their uses. Thus, the right side (the office of which is simply to receive the blood and propel it with moderate force into the lungs) exhibits muscular walls less thick, and valves less elaborately fashioned, than the left, through which the blood is received from the lungs and propelled by the aortal artery through the whole body.

There are four principal cavities in the heart, the first two of which are termed auricles, situated on each side, right and left, though not exactly uniform, and two other cavities termed ventricles, both right and left of the heart, though less uniform even than the auricles. The auricles perform the part of receivers, the ventricles that of propellers.

Between each cavity there is a beautifully constructed valve, the duty of which is to permit the flow of blood in one direction, but to prevent its return again through the same orifice.

The auricle on the right side is furnished with a three-pointed valve, called tricuspid, and that on the left with a two-pointed valve, termed bicuspid. Both these membranes are attached to the walls of the heart by little muscular cords, and, though they appear to be merely finely attenuated threads, they are fashioned, like the valves, with an extraordinary amount of strength and resisting power.

Besides the auricular valves, there are two sets communicating between the ventricles and the arteries. These are termed semilunar valves, and their office is to afford passage from the ventricles to the arteries: the right ventricle forcing the blood into the pulmonary artery, and from thence through the lungs, and the left by the great aorta throughout the whole body.

In order to gain a correct idea of the course in which the tidal currents of the blood are projected, it is necessary to have a starting-point; and this we shall find by commencing to trace the circuit from the left ventricle. Remember always that the blood does not flow in regular channels through the heart, but that it

is propelled by a strong impulse through each valve into its separate cavity. In the left ventricle we find the blood in that bright scarlet condition peculiar to the arterial flow. If we should pierce a vein in any part of the living structure, we shall observe a moderate but by no means impulsive flow of the contained fluid; but if we should sever an artery, a violent upward rush of the blood will testify to the momentum with which the current has been impelled. This impulse is originated by the muscular contraction peculiar to the left ventricular cavity, which forces the blood with immense power through the large arterial tube crowning the broad base of the heart, called the aorta. Directly after receiving the first flow of the arterial fluid, the aorta divides like an arch to the right and left, and again subdivides into four main trunks,—two branches of which extend upwards, when they are called the carotid arteries, and supply the different portions of the throat and head, the other two trunks tend downwards, and branch off on either side of the body into a complex system of tubing, ending in an inextricable net-work of fine hair-like passages called capillaries. The ramifications of this extensive system of vessels are supposed to extend in length to several miles, and it is thus that arterial blood is furnished to the body, supplying the entire system with nutrition and the life-giving oxygen inhaled through the lungs.

In the capillaries, the blood parts with its nutritive qualities, and from thence it is taken up by the veins, the extent and ramifications of which correspond in all respects with the arteries, only that its dark purple, almost black hue, denotes the absence of the vitalizing

elements found in the arteries: but it must be remembered that the chief office of the veins is to carry the blood back again to the great central reservoir of circulatory power in the heart. This they effect by being distributed side by side with the arteries,—intersecting them in thousands of yards of fine hair-like tubing, until they expand into larger proportions, and finally concentrate into four main trunks about the heart, corresponding to the position of the arteries. The large trunks which carry back the venous blood from the heart and throat are called the jugular veins, and the branches which return the blood from the trunk and extremities are termed venæ cavæ. Through these the blood is emptied into the right auricle, and from thence through the tricuspid valve into the right ventricle. Here what is called the great systemic circulation ends, and here the pulmonary or *lesser* circulation commences; for it must be remembered that we started on our analysis by tracing the blood from the left ventricle, but before it can reach this point there must intervene that complete pulmonary circuit through the lungs to which we have previously called attention. The object of this lesser system of circulation is, as before stated, to expose the blood to the oxygen inhaled by the act of respiration, and thus to effect that radical change that converts the dark venous flow into the healthful and vitalizing condition of arterial blood.

The wonders of the circulatory system, and the effects of health or disease which result from a thorough understanding of its influence, cannot of course be fully appreciated from the condensed descrip-

tion which I have herewith presented. It is enough to say, however, that if, as the best-informed physiologists allow, a single grain of poison infused into any given portion of the organism will traverse the whole circulatory extent of tubing in something less than three minutes of time, what an array of poisonous elements are we not perpetually introducing into our systems, in the shape of vitiated airs, fermented liquors, and other injurious articles of food, in the ignorant and unphysiological modes in which nine-tenths of the community pass their lives!

I shall now add a brief sketch of the methods by which food is prepared for the nourishment of the system through the digestive apparatus.

The organs of digestion commence with the teeth, and include the mouth, salivary glands, œsophagus, or food-pipe, the stomach, duodenum, or entrance to the small intestine, the pancreas, liver, gall-bladder, and lacteals.

The three kinds of teeth found in the human jaw are called incisors, canine, and molars. The first of these are designed simply to divide the food, the second to tear it, and the third to bruise or grind it. There are two sets of teeth, namely, the milk-teeth, which supply the gums of infancy and childhood, and the permanent teeth, which take the place of the others, from about the age of six to eight years.

The extreme hardness, diverse fashion, and separate offices performed by the three varieties of teeth fastened into the human jaw, taken in connection with similarly diverse functions performed by other portions of the digestive apparatus, speak as plainly as a divine

revelation that the food designed to sustain man should be of a mixed character, and include animal, vegetable, and cereal productions.

Besides the act of mastication, another important process takes place in the mouth, and this consists of insalivation, or the moistening and preparing the food for swallowing by the mixture of saliva. This fluid is secreted from three different sets of glands: the one pair situated just below each ear, and called the parotid glands; the other pair placed beneath the tongue, called sublingual; and the third, or submaxillary, placed near the angles of the lower jaw.

The fluids secreted from these three sets of glands differ in character, but in combination form saliva. A certain portion of saliva is always found in the mouth, except its flow is restrained by disease, but, like the gastric juice of the stomach, the moment food is presented to the mouth the flow is greatly increased, and sometimes occurs even when the thought of food excites the nerves which supply the salivary glands; this result is known in what is vulgarly called "setting the mouth watering" at the sight or mention of desirable food. After the food has been duly masticated and moistened by the saliva, it is collected by the muscles of the cheeks and the action of the tongue and conveyed against the back part or vail of the palate, which is so hung as to close the cavity of the mouth in rest, yet in swallowing to open it freely and permit the passage of the food into the pharynx.

The œsophagus is an elastic muscular tube resembling the trachea in construction, inclosed on its external surface by a serous membrane; then follows a layer of

thick elastic muscular membrane, the whole being lined with mucous membrane.

By the muscular contractions of the œsophagus, the food is next forced through an orifice near the heart, surrounded with a strong band, or sphincter, into the main digestive cavity, or stomach.

The human stomach is an oblong membraneous bag, situated just below the diaphragm, and placed somewhat obliquely across the abdomen. It has two orifices: the one just alluded to, namely, the cardiac orifice, by which the food is received, and the other at its smaller extremity, called the pyloric orifice, the office of which is to convey the semi-digested food from the stomach into the intestines. Both these orifices are surrounded with muscular bands, which close upon the interior sac, and only open or expand when it is essential to receive or expel the food from the cavity of the stomach.

The stomach has three coats, consisting of an external covering, or serous membrane; a muscular or middle coating, formed of highly elastic muscular fibre, the property of which is to contract and expand, and thus promote the rolling motion occurring whilst the food is being digested in the stomach; and an inner lining, called, as before stated, the mucous membrane, the office of which is not only to cover the interior surface with a smooth slimy fluid, but also to contain the countless numbers of little follicles or glands through which the gastric juices are poured out and secreted; in fact, the entire of the mucous membrane or inner lining of the stomach is pierced with little glands and processes so thickly set, that millions of them may be

counted under the microscope. When this organ contains no food, these glands are at rest, but directly food is introduced into the cardiac orifice, the follicles pour out an acrid fluid secreted within them, which, running down into the contents of the stomach, so dissolves and changes them that all matters which are susceptible of digestion become converted into a pulpy mass, called chyme.

Nothing but solid matter, and that of an organic nature, is acted upon by the gastric fluid. Liquids are at once got rid of, and, when introduced into the stomach in large quantities, materially interfere with the process of digestion. Solid tissues, such as cooked meat, fish, and bread, are most readily dissolved by the gastric juices. Saccharine and starchy matters are ejected in an unchanged state into the small intestines. Gastric fluid, though poured in large quantities into the stomach during the process of digestion, does not remain there, nor is it all absorbed by the food: some portions of it are reabsorbed into the capillaries which surround and overlay the glands, and thus pass into the general circulation and perform the function of nourishing or vitiating the tissues of the body; but the greater portion of the solids, when they are susceptible of being dissolved by the gastric juices, are carried off through the pyloric orifice into the duodenum, or first part of the alimentary canal.

The usual length of the small intestine in man is about twenty-five feet. The opening then widens into a much larger passage, called the colon, or great intestine, the length of which, for about five feet, is traversed by the waste matter, which is finally ejected from

the system. The intestines, like the stomach, have three coats or membranes, consisting of the peritoneal, or serous, the muscular, and the mucous.

The surface of the mucous lining of the small intestine is even more numerously studded with small glands, called villi, than the stomach. Through these villi the nutritive portions of the food are absorbed by a set of vessels called lacteals, but not until the chyme, or half-digested food, has been further prepared by a juice, secreted by a long gland situated on the right side of the stomach, called the pancreas. This gland pours out a fluid called the pancreatic juice, and its peculiar property seems to be to mix with and prepare the fatty matters taken into the system for general distribution.

The final act of the digestive process is performed by the liver. This is a large gland, divided into several lobes, pierced thickly with blood-vessels, and having a circulation of its own, called the portal circulation.

One of the chief offices of the liver is to secrete or manufacture a bitter, acrid fluid, called bile. This is poured out into a small duct adhering to the lower side of the liver, called the gall-bladder. There is a duct which leads direct from the liver into the gall-bladder, and from this again into the small intestine, at or about the same point as the pancreatic duct, and this is called the bile-duct. Through this passage the biliary fluid is poured in a given quantity into the small intestine, changing so materially the character of the chyme, that after it has passed beyond the pancreatic and bile ducts it is converted into a white,

milk-like fluid; in fact, it now assumes that rudimental condition of which blood is formed, and, having undergone its last change in the act of digestion, it is called chyle, and is taken up by absorption through the mucous membrane of the small intestine into a set of vessels termed lacteals, and from thence it is poured into the general circulation through the blood-vessels.

Whatever residue contains matter which is not fit for nutriment is forced on into the colon, and as the lining membrane in this intestine is no longer supplied with nutritive glands, the contained matter becomes hard and comparatively dry, and is expelled in regular course from the system by the excrementary passage.

It now only remains for us to add a few words of description concerning the lacteals, through which the thoroughly-digested food is ultimately converted into chyle and poured into the general circulation.

The lacteals form part of an extensive fluid system, called lymphatics, of which that portion termed lacteals originates in the mucous membrane of the alimentary canal. Here they are imbedded in the form of villi, or minute tubules, imperceptible to the naked eye; and the chyle, or digested food, in its liquid, milky state, is absorbed into these villi, from whence it passes into larger passages, uniting into great branches, and finally combining into one trunk, called the thoracic duct.

Into this main passage all the lymphatics and lacteals are emptied. Its situation is in front of the second lower joint of the spine, or lumbar vertebræ, and after continuing up the backbone until it reaches a valvular

opening, just beneath the clavicle, or collar-bone, it discharges its contents into the left subclavian vein, becomes commingled with the returning currents of venous blood, and is carried into the right cavity of the heart, to be lost in the general circulation.

CHAPTER III.

THE HUMAN ORGANISM—CONTINUED.

PART II.—THE BRAIN AND NERVOUS SYSTEM.

IN describing the wonders of creative wisdom, whether in astronomy or physics, figures convey but little significance to the mind, and the sums by which we seek to define creative processes serve rather to confuse than to enlighten the imagination.

What idea could we form of an atom measuring one four-thousandth part of an inch in diameter? yet such is the only approximate conception we can give of the size in which blood-discs appear beneath the glass of the anatomist!

Hundreds of millions of air-sacs in the lungs, miles of tubing in the blood-vessels and capillaries, and millions of cells occupied in forming the brain, are so many words, which, however true, bring no sense of realization to the mind seeking to learn the nature of the grand machinery of life. It is on account of the poverty of words to express ideas that I withhold those minutiæ of description which apply to the original formation of tissues, and simply state that all the different portions of the body, whether bone, muscle, membrane, cartilage, or nervous matter, are constructed

from minute cells, the primary form of which is a sac of membrane of infinitesimal attenuation and nuclei of microscopic size.

Millions of these, flattened, elongated, rounded, or pressed into spheroids, go to make up a single fibre of muscular or nervous matter. Bundles of fibres, countless in multitude, are bound together to form a mass of tissue; whilst the human body includes the totality of all tissues, organs, systems, and apparatuses. Passing forward, then, to the grand results of formation, we are now about to enter upon that peculiar system of organic life which connects the realms of matter and force, and which begins to shadow forth the sphere of causation underlying the variety of motions which have been described in the preceding chapter.

When we turn from the dead body, which is in reality inorganic matter, and contemplate the immense variety of powers and functions manifest in the living structure itself,—the noblest example in creation of organic matter,—it becomes impossible to narrow down our investigations to the inert masses examined by anatomy, and we must push forward on the road of discovery opened up to us by physiology.

To determine the source of those marvelous activities which proceed with such regular order in life, and ascertain what element it is, the absence of which stills those activities into death and reduces their instrument of expression to inert matter, has been the problem of ages, and one which even now would not have been susceptible of solution if a partial disclosure of the mystery had not been made by the researches of physiologists, and the light which modern science has

thrown upon the powers and functions of the nervous system, under the stimulus of electricity.

For some time past the theory has been advanced, that the hidden and mysterious forces of life were generated by the brain and nervous system in what is termed "nerve aura," and that this element would account for all the phenomena vaguely attributed to a "*vital principle.*"

The simple fact that the nerves, like the rest of the organs, perish at death, and that their tissues retain none of the properties assumed to belong to them except they are acted upon from without, is a sufficient refutation of the fallacy that the "life principle" and "nerve aura" are one and the same element; but when we find a force which can produce upon the organism the effects which we attribute to the vital principle, when we find that force capable of moving the muscles, stimulating the circulation, promoting digestion and respiration, and acting even upon the nervous system itself, are we not then justified in assuming that such a force is one and the same with the life principle? We have a sufficient array of phenomena, through whatever media we observe the action of electricity, to determine that it is the true motor of vital force, and that the physiologist who carefully observes its working as a therapeutic agent, and the anatomist who watches its effects even upon dead matter, have just as much reason to cry, "Eureka! the problem of life is solved," as Franklin had when he ascertained the character of the electric fluid he drew from the thunder-cloud.

Not to anticipate in this place the arguments we

design to present in support of this proposition, we shall now review in brief the structure of the brain and nervous system, and see how far we are justified in assuming that in their operation we find the instrumentalities through which the life-forces act.

It has long been believed that consciousness, intelligence, and will, find in the nervous matter of the brain the seat of those properties by which mind acts upon matter. As a full analysis of all that might be advanced in reference to the subtle links which connect mind and matter would involve psychological as well as physiological definitions, we must confine our attention to the physical relations of our subject, and only touch upon its psychological connections so far as they are essential to elucidate the influences which mind exercises upon matter in the different conditions of disease and health.

In the nervous apparatus of man we find two well-marked and distinct systems, the one called the cerebro-spinal, and the other the sympathetic, or ganglionic system. The cerebro-spinal consists of the brain, the spinal cord, and the nerves, which extend from both these great centres to the ultimate extremities of the body.

The brain is composed of a soft, pulpy tissue, and is inclosed in the cavity formed by the cranium.

The mass of the brain is divided, first, into two principal portions, called the cerebrum, or front brain, and the cerebellum, or back brain.

The cerebrum occupies all the anterior and upper part of the cranial cavity; it also extends to the posterior region of the head, covering the upper portion of

the cerebellum, and resting on the membranes which divide the two. It is seven-eighths larger than the cerebellum, and is supposed to be the principal seat of the intellectual faculties.

The mass of the cerebrum is divided into two hemispheres or lateral halves, and these again have three prominences on either side, called lobes. The lobes are the special masses which fill the concave portions of the skull at the forehead, temples, and back of the head.

The hemispheres are divided by a double fold of membrane, which dips down between them, and cuts the cerebrum into two distinct halves. There are transverse bands of nervous matter connecting these hemispheres, called commissures, and the last and largest of these is situated at the base of the cerebrum, forming a strong band of nerve-fibres, called the corpus callosum.

Towards the base of the cerebrum it becomes inflected inwards, then expands, and forms an intricate cavity, with several chambers, called ventricles.

The surface of the cerebrum is folded up into an immense number of convolutions, which pierce deeply into the substance, and form a complete mass of fissures and eminences. Brain-matter, although uniform in consistence, presents two striking varieties in color, and a specialty in the arrangement of its surfaces. The external surface is composed of a thick layer of nervous matter of a gray color, called, from its ash-like hue, cineritious, and this dips down into all the convolutions, piercing the internal mass in a well-defined, though exceedingly irregular, layer.

This interior mass is of a milky-white substance, semi-fluid in consistence, and called medullary. Not-

withstanding the irregularity of surface occasioned by the convoluted nature of the outer layer, the gray and white matter do not commingle, but preserve their distinct positions throughout the whole mass. The brain is more abundantly supplied with blood than any other organ of the body; but if the extent of brain-surface were limited by the size of the mass, only one-tenth of the quantity of blood would be sent to the brain that it now receives, and this additional provision for its nutrition is derived from the blood-vessels spread out on the membranes, and piercing all the convolutions into which the mass is folded.

There are three membranes inclosing the brain. The external is a strong, firm tissue lining the cranial cavity and adhering closely to the bones; it also dips down between the two hemispheres, and, being reflected back over either side, forms the double fold which divides them. This membrane is called the dura mater, or "hard mother," from the belief of old anatomists that it originated all the strong membranes of the body. The second is called the arachnoid, or "spider-web," from its exceeding attenuation. This membrane dips into all the convolutions, and upon its surface is spread out the extensive vascular system which supplies the brain with blood. The third and inner lining is an exceedingly fine and delicate investiture which incloses all the brain-matter, and is termed the pia mater, or "soft mother," in contradistinction to the dura mater. Myriads of minute vessels are spread out between these membranes, besides which there is a serous fluid secreted by the arachnoid, serving the same lubricating purpose as that effected by the serous sacs which inclose the

heart, lungs, and internal organs. All these membranes, in the same order as they exist in the cranium, form the tubular sheath which invests the spinal cord. The cerebellum, or back brain, is situated at the base of the cerebrum, and is in part covered in by it. In structure, as in functions, it differs from the cerebrum, its surface being furrowed with lines or ridges instead of convolutions. Like the cerebrum, it is divided into two hemispheres, separated by folds of membrane, and united by commissures, or transverse bands of nervous matter. The gray and the white matter are arranged in layers similar to the cerebrum, but it is a curious feature in the cerebellum, that when a vertical section of the mass is cut into and solidified, the white matter is found arranged in the form of a beautifully-defined tree, called from this appearance the *arbor vitæ*, or tree of life.

At the upper part of the spinal column is a singular bulb-shaped mass of white matter, called the medulla oblongata. It is situated immediately beneath the corpus callosum, between the right and left hemispheres of the cerebellum, and forms the point of union between the brain and spinal cord, although it properly belongs to the latter. Its functions in the nervous system are complicated and important, and anatomists assign it a very prominent position in the distribution of nerve-force. It is not necessary in this condensed description of the cranial anatomy to dilate upon all the divisions and subdivisions into which this little body is resolved; it will be enough to mention four, the functions of which are far more important than their unpretentious size would lead us to expect. The

medulla oblongata is divided into two halves, like the spinal cord, and although these are traversed and united by bands of nerve-fibres, the functions of these columns are obviously different.

The anterior half of the medulla is the gate through which all the powers of motion are transmitted to the nerves throughout the body; the posterior half performs the same office for the sensory nerves; in fact, whatever powers originate in the brain must be transmitted through the medulla oblongata, and in reflex action, whatever sensations are transmitted to the brain must in like manner pass through this singular little mass of nervous matter. The medulla oblongata is also subdivided laterally, so that two distinct centres of sensation are found to exist in the posterior half and two corresponding centres of motion in the anterior column. It has been found that if one of the anterior columns of the medulla is cut away, the power of motion in one half the body is lost, although, in the other half, motion will remain and sensation is unimpaired; remove the other half of the anterior column, and all motion ceases; the same results to the powers of sensation are obtained by cutting away the posterior columns separately or together.

Experiments made on living animals have shown that whilst successive portions of the brain may be cut away until it is all removed, so long as the medulla oblongata remains uninjured, the functions of breathing, deglutition, and the automatic processes of life still go on undisturbed.

A very slight wound at the centre of the medulla is sufficient to produce death, and the functions of motion

and sensation are, as we have shown, absolutely dependent on its integrity and perfectness.

It has been assumed that the instinctive powers of animal life were centred in the cerebellum; but, whilst that organ is undoubtedly essential to govern and combine the instinctive powers, the much smaller mass of the medulla oblongata is evidently the chief centre of the powers themselves, and without its preservation, motion, sensation, and even life itself, cease to animate the organism.

There are twelve pairs of nerves given off from the brain, and from thence to the organs of special sense and different portions of the head. The first pair terminate in the inner portions of the nose, and are called the olfactory nerves; the second pair supply the retina of the eye, and are called the optic nerves; the third, fourth, fifth, and sixth are also distributed about the eyes,—the third, fourth, and sixth being motor nerves,—the fifth pair, called the trifacial, are sensory, and send off branches which supply the cheeks, nose, and mouth. The seventh pair are the general motor nerves of the facial muscles. The eighth pair are called auditory nerves, and end in the interior of the ear. The ninth pair supply the back of the mouth and pharynx. The tenth are a very important pair of nerves, called pneumogastric. They originate in the medulla oblongata, communicate with the lungs, heart, and stomach, and indeed ramify through the viscera to a considerable extent.

The eleventh pair supply the muscles of the neck, and the twelfth communicate with the tongue and the organs of speech.

These two pairs are called spinal accessory and hypoglossal; but physiologists are not in general agreed upon the classification and names of the cranial nerves.

The nerves are mostly cells, or tubules, composed of membraneous sacs or sheaths lined with nervous matter, inclosing nerve-filaments in the form of bundles, which stretch away, divide, and subdivide, but never lose the original quality of sensation or motion which they derive from their roots. In every membraneous sheath it is believed there are two distinct sets of filaments, one of which communicates with the cerebral hemispheres, and the other with the spinal cord.

The spinal cord itself is a long, irregular column of nerve-substance, inclosed in a sheath, composed of the cranial membranes prolonged down the spine. It extends from the medulla oblongata to the second lumbar vertebra of the spine.

The spinal cord, although composed of gray and white nervous matter like the brain, presents a different arrangement of the layers, the white matter being on the external, and the gray, or cineritious mass, forming a band which traverses the interior of the column.

Like the medulla oblongata, the spinal cord is divided into two symmetrical halves, united in the middle by a commissure, or converging lines of nerve-fibre; it is also separated into an anterior and a posterior column by a vertical fissure. Each lateral half is traversed by two longitudinal tracts which separate it by distinct furrows. Thus, there are on either side three well-marked columns, called the anterior, posterior, and lateral.

The cord is enlarged at the neck and loins, and from

these expansions are given off the nerves which supply the upper and lower extremities. From the spinal cord are given off thirty-one pairs of nerves, the roots of which spring from either side, right and left. The first eight pairs arise in the region of the neck, and are called cervical; the next twelve pairs, corresponding to the number of ribs, are termed dorsal; then arise five pairs which spring from the lumbar vertebræ; and the remaining six originate in the vertebral bones which divide the basin of the pelvis, and supply the lower abdominal regions.

Every nerve-trunk arises from a distinct root, and these roots originate in pairs, one in the anterior and the other in the posterior half of the column.

The nerves which spring from the posterior half are nerves of sensation; those in the anterior division of the cord, motor nerves. And here let us remark that, like the columns of the medulla oblongata, if one of the sensory nerves be divided at any portion of its length, the ultimate point which it supplies becomes destitute of sensation. A corresponding effect is produced by dividing a motor nerve: the muscle or joint with which it communicates will never move more, and that, notwithstanding that the brain and spinal cord may remain in their perfect integrity.

To cut or sever the cord itself in any portion of its length is paralysis of both motion and sensation in all those parts of the body supplied by the nerves arising below the point of injury; in fact, it is manifest that the stupendous powers of motion and sensation find their instrumentalities in these little insignificant-looking nerve-filaments; sever, wound, or injure them, and

paralysis of motion or sensation is just as inevitably the result as if the columns of the medulla oblongata were cut away as above described. The nerves arise, as we have said, in pairs; a nerve of motion and sensation in one half of the column, and corresponding roots springing from the other half,—the sensory nerve-roots arising from the posterior division, the motor from the anterior. These pairs arise at first singly, but they soon after combine into a ganglionic knot, again to divide and subdivide, and indeed to ramify into countless fibrous lengths, supplying every part of the body, reaching to the ultimate points of the skin, the interior of the bones, muscles, membranes, tissues, and blood-vessels; in fact, it would be impossible to conceive any portion of the organism which is not supplied with some extension from the main trunks of the cerebro-spinal system.

It must be noted that nervous action is invariably dual or reflex: for example, the cerebrum wills to move a joint or contract a muscle; the thought is immediately telegraphed through the medulla oblongata to the desired point, and whatever sensation is produced by that motion is instantaneously telegraphed back again to the brain by the corresponding nerve of the pair. Of course there are a vast number of motions going on in the system which proceed wholly independent of volition. Many of these arise under the influence of the pneumogastric and spinal accessory nerves, also from the ganglionic or sympathetic system, the nerves of which supply the functions of organic life; but whatever motions are produced under the influence of nerve-action, are telegraphed back to the

brain by reflex action. When the system is in health, the motions that proceed in the various departments of organic life are so mechanically perfect that they produce no other sensation than a generally exhilarating realization of life; but when, on the contrary, there is a lack of equilibrium in the system, and torpidity or excessive action ensues, the result is disease, and the announcement of its presence is telegraphed to the brain in the sensation called pain. It may be argued against this position, that the ganglionic nerves (a system which supplies the viscera and is profusely distributed about the head and trunk) are neither sensory nor motor, hence that those portions of the organism supplied by the sympathetic system do not convey to the brain the sensations of pain.

To apprehend the working of this complex scheme of nervous action, we must consider the nature of the ganglionic or sympathetic system, and its connection with the cerebro-spinal nerves.

The sympathetic system consists of a double chain of nervous ganglia, running along the front and sides of the spinal column, and connected with each other by slender longitudinal filaments. Each ganglion is reinforced by a motor and a sensitive filament, derived from the cerebro-spinal system, and thus the organs supplied by the sympathetic nerves are brought directly into communication with the brain, which is kept informed of all the influences operating on the organs supplied by the sympathetics. The nerves of this system are distributed to the heart, liver, spleen, kidneys, intestines, generative organs, head, neck, lungs, and blood-vessels.

The whole system abounds in ganglia, which form plexuses of glands and nerves, and completely overlay the organs which they supply. Masses of sympathetic ganglia abound in the abdominal regions, the largest of which has been named, from its numerous inosculations, the solar plexus; but the entire system communicates, first with each part of its own system, next with the cerebro-spinal system, and finally with all the internal viscera.

Now, although the connections between the two systems are preserved throughout the body, they are nevertheless much scattered; and as the sensory and motor nerves do not penetrate into the internal portions of the organism, where the sympathetics most abound, it follows that the telegraphic communications which the latter send off to the brain must proceed more slowly, as they act through a secondary system. It is for this reason that the parts of the body immediately under the influence of the cerebro-spinal nerves are more sensitive to pain than those supplied by the sympathetics. The sensations travel more slowly, and the motions, being purely instinctive, do not report themselves to the brain as directly as those operating immediately under the influence of the will. Still, they are reported, and it is by this intimate connection between the two systems that the brain is kept informed of all that is transpiring in the body,—of all its states and conditions,—and that without the fatigue and wear which would ensue if every motion were immediately under the influence of the will.

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other, and the intelligence resident in the brain, we may clearly understand how the skillful physician is enabled to interpret the nerve-language which assumes the tone of pain; and the only marvel is, that the experience and observation of more than two thousand years of medical practice have not been sufficient to reduce symptomatic indications to a far more exact status than that which it at present occupies. But let us retrace our footsteps a little, and see if in this respect we demand too much.

The cerebrum is obviously the seat of consciousness. No matter how structureless and insignificant may appear the matter of this grand cranial instrument, considered in its physiological workings it is the seat of consciousness. The cerebellum is the governing organ, which controls and directs in harmonious combinations all the purely instinctive motions of the system, and enables the will, emanating from cerebral influence, to put its designs into execution.

The medulla oblongata keeps the gate through which the telegraphic messages of the mind pass forth, and the obedient responses of the muscles, or the complaints of any diseased organs, inform the consciousness of their condition. The cerebro-spinal nerves, with their dual functions of motion and sensation, provoke the muscles to act, and report faithfully back to the brain the sensations which all such actions have produced.

The pneumogastric and spinal accessory nerves, together with the whole array of the sympathetic system, pierce into the dark and hidden places, removed from the exercise of the will; but still they cannot escape

from the duty of reporting their condition upon the little fibres of the cerebro-spinal system with which they are connected, and this again sounds the alarm in the tones of pain through the cerebral hemispheres, where it reports itself, with the accompanying demand upon the physician's art to restore the equilibrium which any suffering organ has lost.

But here the physician himself intervenes, exclaiming, "Your picture is an exaggerated one, and does not tally with the stern demands of science and the accurate revelations of fact. The nervous system does act in the way you delineate, and does aim to record the conditions of the organism it supplies with all the fidelity of which it is capable; but that it does or can make a *correct* record of all the conditions under which the system becomes diseased, that it can locate and disclose the *exact* extent of the degradation which has beset hidden organs, internal tissues, tumors imbedded in secret places, and fluids whose course no eye can trace, is an assumption which none but the ignorant or transcendental would venture to put forth.

"All that the physician's art can achieve must be learned from symptoms; and these do not, as you allege, constantly and correctly report themselves on the brain, inform the consciousness, or register their procedures on the cerebrum. Your position is a fallacy, then, your picture a fancy sketch." And now, world of therapeutic art, and realm of medical science, it is at this point that I propose to take leave of you.

Here it is that I, the disciple of electrical science, and the propounder of a new method in therapeutics, commence my path of departure. Electricity is at

once my motor-power, my registrar-general; the force of my will, the carrier of my will, my silent and involuntary operator, working the machine whilst I sleep, wakening me by a sense of pain to inform me when I am afflicted, writing the record of my case on my brain when I am otherwise ignorant of it, and then submissively bowing its supreme powers and forces to my control as my agent of cure, provided only I have learned its language and can read its silent but infallible records. Electricity, I repeat, can and does inscribe on my brain a chart of the organs of which I am made up, and electricity can and does record, in characters which all may learn to read, the conditions of every organ and the extent of every form of suffering which afflicts it. If the physician has not learned to read this language and interpret the chart which the life-lightnings have inscribed on the human head, his ignorance is no excuse for mine, and no evidence that I cannot perform what he fails in; nay, more, it is because I can read this infallible record, and that with the precision of a mathematician evolving his problems on the principles of exact science, that I now write this book, demand that it shall be read, its assertions tested, and its claims admitted or rejected only upon the basis of practical demonstration. I teach herein the people who read, to understand their own organisms, without being compelled to shipwreck brain and intellect upon the ocean of technical verbiage. I teach the people who read, that a new form of therapeutics is in the world, safe, sure in action, applicable to all forms of suffering, attainable in practice to all classes of operators, if they will study the methods and ob-

serve the laws which govern it. But I also teach that if the powers of this great curative agent can bring blessing, it is also susceptible of producing injury.

Abuse its powers rudely, grasp its lightnings with the hand of blind ignorance, and it will retort upon you with added suffering, and perhaps destruction; but reverently study the laws by which it acts, and apply them in the due formulæ of its sublime and scientific modes, and it will become a therapeutic agent in your hands more swift, sure, and beneficent than all the drugs that have ever been compounded since the days of Galen, or all the theories that have been enunciated since the generation of Aristotle.

CHAPTER IV.

MATTER AND FORCE.

Up to this point we have only been treating of the human structure in its physical organization. It will now be necessary to analyze the conditions of motion and characteristics of force, which draw the line of demarkation between living and dead matter.

The subtle connections by which mind is enabled to act upon and through matter, must reside in the realms of force; and although this is a subject that has baffled the researches of philosophy to explain, it may be quite possible to throw light upon it when once we have obtained a clue to unravel the mystery of what vital force really is.

Before presenting to the reader the arguments by which I propose to sustain my opinion, that electricity and the vital force are analogous, if not actually the same elements, I desire it to be understood that I am quite aware this proposition, whenever hazarded by others, has been met with what seems to me to be a most unreasonable and illogical amount of scorn and denial by many of the most authoritative scientists of the day.

That electricity, as manifest in the thunder-cloud, acts in a totally different way from the silent flow of the vital currents in man, I admit; but it is now generally

conceded that that same electricity in the thunder-cloud is an element closely analogous to, if not actually the same as, that evolved from the Leyden-jar, the friction machine, and even the electro-galvanic and magnetic battery. Now, the force generated in the electro-magnetic battery produces a set of phenomena in the human structure almost similar to the action of the life principle itself. For example, when this life principle is plus or minus in the human system, when it is deficient at one point, or circulates with inflammatory violence in another, I know of no better method of regulating it, supplying its deficiency, or controlling its force, than the action of the electro-magnetic battery and the introduction of electricity into the system.

I will, however, proceed with the various propositions I have to allege on this subject, and that not for the purpose of arraying my opinions against those of more popular authorities, but rather because I think the clear understanding of this question throws light upon the best methods of dealing with the organism vitalized by the life principle, and aids the physician in the application of electricity as a remedial agent.

To obtain the most comprehensive view of the action of the electric force, we must remember that gravitation, heat, light, attraction, repulsion, and all other forms of motion known in the universe, refer back to some original force. That force may be considered as a unit, for every form of motion seems to have but two modes, and those are attraction and repulsion. We call these dual forms of motion by many names, but after all they are still attraction and

repulsion, or positive and negative. It seems reasonable to assume, then, that electricity in the atmosphere, magnetism in the earth, the properties of loadstones and minerals, the forces which regulate the orbits of bodies in space, no less than the principles of growth and decay, are all parts or modifications of one original force, and whether we call them galvanism, magnetism, electricity, life, vitality, or motion, all and each move in one of the two modes indicated above, so that in comparative rest they may be called positive and negative, and in action, attraction and repulsion.

Whilst I assume that this universal force includes all forms and varieties of motion, we must also be prepared to find great varieties and many modifications in forms of motion, owing to the countless varieties of material through which force is exhibited.

It may not admit of a doubt that the principles of cohesion that bind together the atoms of a dew-drop, are the same as those that combine in one grand system of unity the planetary satellites of the sun.

The same powers of repulsion that hold apart the atoms in that dew-drop and prevent its crystallizing into a solid body, operate in a similar way to prevent the planets from yielding to the attractive force of the sun and rushing together in a single mass. Yet the exhibitions of attraction and repulsion in dew-drops and solar systems do not convey much analogical meaning to the mind, and the forces required to sustain and uphold the mighty machinery of the universe lose all significance as we contemplate them in microscopic forms. Still, they are the same, and though modified by the media of the material objects through which

they are exhibited, I believe the dual modes of one original force will explain all the varied phenomena which we call by many names, life and electricity included. Again, I would suggest that the modifications of force exhibited in electricity and the living organism are so often analogous to each other, that, allowing for all the differences of action which we must expect to find between the fluid which traverses the delicate tissues of a living body and that which is eliminated from two or three inorganic pieces of metal, I cannot discover any rational cause for denying the identity of the force, or questioning that the vital principle in man is electricity because it does not evolve all the phenomena produced through the battery.

As a mere theory, it would matter little whether this point were established or refuted, but when it comes to a matter of practice, and I find myself searching for the laws which connect the influences of the living tissues and the forces of electricity, in order that I may control the latter as a remedial agent for the former, it then becomes me to analyze all the phases of the subject, and that in the unprejudiced and dispassionate form which so important a research demands.

In the first place, then, I find that galvanic action can be obtained by placing a number of slices of muscle, recently taken from the body of an animal, in the form of a pile.

Such a battery has been found to act upon galvanic instruments, and, according to Fernand Papillon, to excite contraction even in the muscles of living bodies.

The experiments which prove that galvanism, magnetism, and electricity can stimulate the nerves in dead

matter to perform many of the functions of life, such as muscular contraction, respiratory motions, etc., are too numerous and too well established to need reiteration; on the other hand, the question has long since been decided, that no agent is so effective in promoting all the functions of life within the organized body as electricity.

M. Becquerel, whose long years of industrious research into the phenomena produced by electricity from living tissues give him the most authoritative claim to be heard on such a subject, affirms his belief that electricity is the mysterious agent to which the action of the capillaries in the human system is due. He even gives the term 'electro-capillary' to this form of motion, besides assuming that the veins and arteries in proximity form pairs, which, on electro-galvanic principles, may account for the processes of circulation much more satisfactorily than in any other way. That the immense vitality of the nerves and the important functions they perform in the human organism are intimately related to the dual modes in which electricity is evolved from a battery, has long been a subject of speculation to the unprejudiced philosopher. The arrangement of nervous matter into gray and white layers, and the disposition of nervous fibres in pairs at their points of origin, are both suggestive of the close analogy which exists between the human organism and a grand battery, wherein the electric fluids are softened and subdued to the degree of tension proper to so fine and complex a system as that of man.

Whilst experimentalists in other countries have been devoting their opportunities of research as much to

the qualities of the electric fluid as to its action, I submit that my twenty-five years of equally industrious research and continual experience have qualified me to speak on the subject of that action, and the results of my observations leave no shadow of doubt in my mind that the life principle in man is electricity, and that all the forms of motion transpiring in his organism are due to the flow of electric currents generated in the brain, renovated and nourished by the electric fluid transmitted through the lungs by the blood currents to the brain and nervous system, distributed by the blood as pabulum to the muscular tissue, and absorbed through the appropriate conduits of the skin from the atmosphere, just as plants drink in carbonic acid gas through the same medium.

That action and reaction is the law of life is an axiom too self-evident to admit of dispute. Whilst the frame can and does give off electricity then, as witnessed in the phenomena of animal magnetism,—sparks emitted from the hair in friction, the clothing in cold weather, and even the fingers' ends when the feet are briskly exercised upon a carpet,—and whilst electricity can and does stimulate digestion and circulation, provoke nervous action, muscular contraction, enter into and assimilate with the human organism more completely than any other element in nature, and whilst its absence from the body in the thunder-storm produces lassitude, and its abundance in clear, cold weather stimulates to high energy, I ask no other testimony than the obvious revelations of Nature herself to elucidate my theory.

Were the opinions of every scientist opposed to my

belief, these and multitudes of other indications evolved by the phenomena of life, health, and disease, would suffice to assure me that I supply the very principle of life itself when I infuse electricity into the system.

In 1849 a young man by the name of Russell, sailing on the Alleghany River, was upset from his boat opposite the Pittsburg Water-Works. It was quite thirty minutes before the body was recovered from the water, and attempts were made by the ordinary methods of friction, etc., to produce reanimation. Being present at the scene of the accident, I succeeded in procuring the opportunity to apply my battery to the inanimate form in my own way. In about ten minutes the man gave signs of returning life, and in less than half an hour he was completely restored. About sixteen years previous to this occurrence, two of my nearest and dearest relatives, namely, a brother and sister, were killed simultaneously by a stroke of lightning. My mother, being present at the scene of the tragedy, received a sufficient portion of the shock to paralyze one side of her body, thus apparently destroying the functions of life in one half of the system. That dead half I subsequently restored to life by the action of certain rude batteries, in the construction of which I, even then a child, endowed with strong tendencies in that direction, was myself the mechanic. I do not wish to burden my work with details which might prove irrelevant to its main points of interest; I have only given, therefore, the briefest summary of this corollary of incidents; but I would ask the least analytical mind that peruses them to array itself in the attitude of a deliberate judgment upon this singular

chain of testimony. The *electric fluid* produces death in two individuals, and semi-death—that is, death of one-half of the life functions—in another, and that same electric fluid restores the life functions thus partially arrested in the one organism; and in yet another case, where the entire action of the vital principle was suspended, and seemingly destroyed, by drowning, it restores it to its normal condition of activity. Here stand, then, three infallible witnesses of life, death, and cure,—each arraying itself under the fiery banners of electricity, and each performing its separate office upon the human frame.

Physicists may insist that there exists a difference between the phenomenon which operates in the ovum to promote life and ultimate organization, and that which suspends the action of life, and, by its withdrawal, ultimates in disorganization; also, that there is a difference between the force which within the system causes muscular contraction, nervous irritability, respiratory action, and circulatory flow, and that which without the system will produce all these results when applied to it; but, for my part, I can only see differences without distinctions, and distinctions without differences.

As regards the life currents, their action upon healthy organisms all tend to a general condition of equilibrium, and consist of an immense number of minor polarities established throughout the system.

So noiselessly and harmoniously do these life currents flow on, that all the complex forms of motion proceeding in the heart, lungs, stomach, and viscera, act without arresting attention or causing sufficient disturbance to excite a recollection of their action.

Five hundred pieces of muscle are set in motion, and their contractile movements excite nothing but pleasurable sensations.

Six hundred millions of air-cells are inflated in less than a second of time, with no appreciable results but enjoyment; miles of tubing are engaged in carrying forward a profound system of manufactory with solid and fluid machinery, and all this goes on without causing a single jar in the marvelous array of activities to impress the brain with one single idea of what is transpiring. Surely no one will insist that all this vast, moving machinery is propelled by muscular contraction, when it is evident that the muscles are stirred to motion by the nerves. It cannot be "nerve aura," as the phrase goes, when it is conclusively proved that a large amount of the pabulum supplied to the nerves is derived from the blood. It cannot all proceed from the activities of the blood, since we clearly perceive that the blood derives much of its vital quality from the inhaled air of the lungs; neither can the great motor reside wholly in the lungs, for the lungs are nothing more than air-cells except they receive the nourishment of the blood and the stimulus of the nerves. Does, then, the force lie in the system of digestion, and grow out of the superior quality of the food we consume? Again we are baffled, for on the very threshold of this inquiry we are met with the fact that blood, air, nerves, and muscles must all combine in action ere the digestive apparatus can supply the tissues with the nourishment which it is their office to prepare.

But, say the philosophers, "You forget that it is not in any special function that the ALL of life resides. It

is in the fact of organization as a whole, in the fact that a grand unity of forces is brought to bear on the frame, that life inheres therein as a general product." Supposing we could grant this position, how, then, would philosophy explain the phenomenon of death? how would it resolve that a paralyzed limb should cease to be a part of the grand organism one moment, and by the action of the electric battery assume its place as a part of the organism the next moment?

How comes it that the organism, if its vital power be purely organic, should ever become diseased? and how is it, in fine, that being diseased, the self-same electric battery can and does restore it to its normal condition as an organism? These are problems which philosophy must meet. If it would take and hold its rank as such, it must explain to us the action of life and death.

It must tell us, if the organism itself is the cause of life, or, in other words, its own cause and its own effect, why it is active in life and still in death.

The organism is the same in both conditions, and yet how different! What constitutes that difference, and what is it that renders it an organism one moment and inorganic matter the next?

Organization cannot be its own cause and its own effect; this is an unanswerable axiom, and one which must be met ere the question can be left in the hands of the *philosophers*, who would refer the sources of life back to any material cause, whether in the several parts or their totality. I have put these positions before the reader less in the spirit of antagonism to what I deem wholly untenable philosophy, than to lead the mind to the rational, legitimate, and demonstrable position that

the life principle is electricity, that disease originates in a disturbance of the electric currents; hence that the only element of cure with which we can hope to deal successfully and radically must also be electricity. This position is not difficult to prove, and the attempt to disprove it only strengthens our case, and forces us back perpetually to the same great remedial agent. What, then, remains to be discovered? Why, simply that method of eliminating the fluid which will best adapt itself to the finely attenuated currents in the human system, and next to search for, and put in practice, those laws by which different qualities of the fluid can be adapted to different conditions of the diseased organism.

In the perfectly well-balanced condition of the human structure, one in which every function is in active operation, the mind controls and directs the organs and puts them to far higher uses than merely instinctive actions.

But when the body is diseased, the mind in strong sympathy with the body cannot effectively control it, and, what is more, all the conditions, from raving madness to imbecility or morbid melancholy, may be traced to their source in the influence of a diseased organism. Of what stupendous import, then, becomes the discovery of the link that connects mind with matter!

That mind is not matter is evident from the fact that mind cannot *will* the body well, when it becomes diseased: a link must exist between them, then,—a link which is not intelligence, nor yet inert matter. That link is force; and if force be electricity in the

atmosphere, the planets, suns, systems, rocks, stones, crystals, metals, and plants, why not in the living tissues, so strongly and readily affected by electricity?

Electricity is the universal force of motion, the substance of life, the grand distributer of living and subordinate forces throughout the whole arcanum of nature.

The cause of life must also be the source of health, disease, and cure. That better and more perfect instruments may yet be constructed for the generation of electricity, and better modes of adapting it to the human system than at present exist be discovered, we may all confidently hope and expect; but though electricity is yet in its infancy as a science, and its application as a remedial agent is as yet very imperfectly understood, enough is known, and enough even in this brief treatise has been discussed, to prove that its action as a therapeutic must depend greatly on the scientific understanding with which it is administered, and the adaptation of its forcible but subtle powers to the various conditions which it is designed to operate upon.

CHAPTER V.

THE CRANIAL DIAGNOSIS.

EVER since the uses of electricity have been recognized in the treatment of disease as a popular remedial agent, it has been observed that the application of one of the poles of the battery, attached to a sponge or used as an electrode in any way, would produce especially painful sensations when directed to a sore spot or diseased organ.

Those who have improved upon this method of diagnosing by aid of the battery, and carefully watched the effects produced by passing over the organism with the electrode, must be aware of the peculiar susceptibility of the fluid to detect disease. Indeed, we need hardly remind any of our readers who have ever witnessed electrical medical practice, that it has often been a source of amusement no less than astonishment to watch the injured muscles contract beneath the action of the searching fluid, or the hurt nerves quiver when their lost equilibrium was revealed through the pungent applications of electricity.

Ignorant lookers-on have been actually seen to smile, and felicitate themselves with the air of spectators at an amusing entertainment, as the victims of this kind of diagnosis shrank away from the lightning-knives that were piercing their suffering frames; and none but

the hapless patients themselves seem to have realized that such experiments were painful, might be productive of injury, and sometimes did actually result in muscular contractions, nervous spasms, and local aggravations of disease.

Make as light of the subject as we may, one thing is certain: if electricity can cure, it can also kill; if it can assuage pain, it can just as surely produce it; it can create as well as disperse tumors, paralyze as well as renovate, and injure by unscientific applications as effectually as it can benefit the organism by skillful methods. My own practice has been marked by multitudes of cases in which patients have come to me with partial paralysis, aggravated conditions of tumor, and nervous derangements, occasioned by *rank malpractice* with galvanism and electricity; and thus we keep adding to the list of diseases which already afflict the race, and convert the healthful currents of electric life into a fresh source of bane and injury. Besides the actual suffering experienced in submitting to this mode of diagnosing, I find, from repeated observation of its action, that it is not reliable in detecting disease.

I have myself watched the operator passing the electrode over the surfaces of diseased organs, such as the kidneys, heart, liver, etc., and utterly fail to discover the seats of injury hidden beneath. These failures, no less than the serious damage the structure is liable to receive in feeling for the parts affected, determine me to put in my protest against such pernicious attempts. In fact, as above stated, I have seen the worst effects produced upon persons thus examined, and I have long since come to the conclusion that if there

was no better way of diagnosing disease, the old plan of symptomatic indications, confirmed by partial guess-work, was at least more safe and far less painful.

Careful study and systematic research, however, have unfolded to me not only a safer but a far surer method of diagnosis, and that by the scientific application of electricity, in such a fashion as reveals a new and wonderful phase of anthropology. It is many years since I discovered that the human brain is a chart upon which may be found delineated all the organs of the body, and with these, a correct and comprehensible record of the exact condition in which the organs exist. I am quite aware that the theories of anatomists, and many of the self-elected arbiters of opinion upon medical subjects, are opposed to the acceptance even of the possibility that such a system of diagnosis can be made. It was only since the writing of this chapter was commenced that one of my students, commenting on the invariable success which attended this method of diagnosis, was insolently rebuked by a well-known medical practitioner of the city of Philadelphia, on the ground that it was *an impossibility* to detect diseased conditions of the various organs on the brain, and that the woman who claimed to do so "was mad," and any one who reaffirmed it for her was as mad as herself!

Remembering that every great reformer who has dared to advance one step beyond the beaten path in which mediocrity delights to run, whether in religion, art, science, or politics, has been invariably called "mad;" recollecting, moreover, that one of the most popular definitions that has ever been rendered of genius is, that it is "insanity," I can afford to con-

tent myself with the brand of insanity, shared by the noblest and most progressive minds in the world, and simply reaffirm to my readers that for twenty-five years I have practiced this method of cranial diagnosis with invariable success; that I have communicated it to several of my pupils, who practice it with more or less correctness according to their capacity to master its scientific details; that I still follow it, and at this present writing may be found in its exercise any day during business hours, when those who seek me for this purpose are in attendance.

It was about the year 1848 that I arrived at the conclusion that the nature and seat of disease could be correctly ascertained from cranial diagnoses. I beg distinctly to state here, that I do not derive my system from phrenology, nor any accepted or rejected methods now in use. I conceived the idea that the brain, as the great nerve-centre and focal point to which all sensory and motor nerves report themselves, should be the map on which the organs and their special conditions are represented. I tried and demonstrated the correctness of this hypothesis in a series of carefully conducted experiments, and the result has not only proved the truth of my theory, but furnished me with hundreds of explanations to suffering conditions of the physique, which would else have remained a sealed book to me. I do not conceive that I am bound to bestow upon the army of quacks and pretenders who flood the world, the results of my long years of study by publishing the minutiæ of my system, neither do I propose to put this new weapon of defense against charlatans into their very hands.

The gentlemen who think that any woman must be mad who pretends to know more than they do, or deem nothing but lunacy can advance one step beyond them, may find out as best they can the secret of my madness.

To the students who do not believe they know everything, and realize how much more effective my method has been to discern the true character of disease than the assumed sanity of fossilized schools of routine practice, my system has been taught; and in every instance in which it has been studied intelligently, it results in the same characteristic methods of cranial diagnosis.

I have now only to add, that in making these diagnoses I attracted the attention of some medical practitioners in New York, whose modesty was as eminent as their skill. These gentlemen, who were not of that school of thinkers whose highest authority is to be found in the single vowel *I*, have frequently attended my operating-rooms, pronounced the results of my electrical diagnoses truly wonderful, and a complete revelation in therapeutic science.

In conclusion, I have now been practicing this method for upwards of twenty years. To assume infallibility for the status at which I have myself arrived would be an amount of arrogance worthy only of a sect, a clique, or a craft; but I nevertheless believe that the system itself is infallible, and when humanity has sufficiently realized the subtle relations between the brain and the physique, to follow them out in their exactitude, it will be found possible to detect the scratch of a pin or a slight bruise recorded on the marvelously fine tablets of the great nerve-centre.

In this connection I feel bound to state that my method of cranial diagnosing—the result of many years of study and research—is now secured to me by caveat. The charts on which the system is laid out with mathematical precision will in due time be given to the world, and when once popularized, I shall no longer be subject to the attempts of presumptuous imitators to acquire in a few short hours the knowledge which it has cost me a quarter of a century to perfect. Meantime, the facts which result from my labors are testified to by an army of living witnesses, in the face of whose grateful recognition of my services I can afford to be stigmatized as "mad" by presumptuous ignorance and unscrupulous charlatanism.

THE RATIONALE OF DISEASE.

The principles upon which I base my applications of electricity to diseased organisms must have already been apprehended by the intelligent reader in several parts of this volume, but in order to afford to the unscientific student the greatest amount of facility for mastering as much of the subject as may be necessary for domestic practice, I shall here lay down again, in the plainest possible terms, my theory of disease and cure.

In health, I claim that the various motions of the body, whether under the guidance of will or simply instinctive, are all operative by the influence of force. I claim that vital force, or the "life principle," is not a property of vital tissue, nor yet the result of organization.

Muscular contraction, nervous irritability, etc., are secondary results, and merely modes in which the one great original force of life expresses itself through different tissues. As to the question of organization being the cause of life, the phenomenon of death occurring, as I have before shown, whilst the organism is itself intact, and the fact that life precedes organization, and is its cause, rather than its effect, form arguments against this position, from which there is no appeal.

What, then, remains? I claim that the life principle in man is the life principle in all things; that the nearest approach we can discover in elemental substances to this universal life principle is electricity, with all its different modes and varieties of exhibition.

Health being the normal condition of the body, in health the electric currents are all in perfect operation, and their equable flow, in traversing the system, is itself health. Now, the least disturbance in the distribution of the electric currents must of necessity affect the points where that disturbance occurs. For instance: if the stomach or any portion of the digestive apparatus absorb too much or too little food,—if the pabulum which supplies it is unfit for its support,—the life-lightnings are arrested, or unduly quickened, by the interposing obstacles. They refuse to act, or are forced on with undue excitement; the loss of equilibrium is the loss of health; and disease, engendered by the first disturbance of the life-currents, immediately ensues.

One disease begets another, and before the silent channels of the force can be renovated in one direction

they are so obstructed in others that slight disabilities become chronic diseases, and various unnatural conditions are set up from the one original hindrance.

The first disturbance may occur in the lungs, head, spine, skin, or at any given point of the body; but, wherever it is, the real source of disease lies in any check or unnatural impulse given to the flow of the life currents. If the lungs inhale vitiated airs, or too little or too much of the oxygenated fluid of the atmosphere, a disturbance is at once set up in the lung-tissues, by which the blood is corrupted, the body deprived of nutriment, the health equilibrium destroyed.

This theory of disease applies with universal force to every part of the system alike. If, then, we are looking for a universal restorative as well as a universal cause for disease, in what can we possibly find it but in the life-giving element itself? It is an impossibility to obtain the vital fluid, modified by passing through the living tissues, except in the element given off by animal magnetism. Even if the living magnetic forces of one individual could apply to all the varied conditions of many (a thing which experience proves to be an impossibility), we should still require that the magnetizer should be perfectly healthful, sound, sane, and then possessed of the requisite mobility of fluidic life to apply to all conditions of organism and disease.

The improbability of attaining the perfection of such an instrument in all cases, even where the possibility existed, renders the application of animal magnetism inadmissible as a regular therapeutic agent. Again, therefore, we recur, with reasonable chances of success, to the existence of a mineral fluid possessing the near-

est proximate similitude to the vital principle, and capable of such modifications of force and quality as will be found applicable to many conditions of disease. If we cannot always insure success in the use of the battery when directed by science and controlled by skill, we must remember that in its application to remedial purposes electricity is, as yet, but little understood.

To destroy cancers and tumors, remove fibroid growths, and distribute the forces of life equally through paralyzed parts or inflamed tissues, electricity has already been an approved instrument. To cure nearly all nervous disorders, and apply successfully to morbid conditions of the blood, digestive or respiratory organs, the electrical forces have been acknowledged as the most available means. For the amputation of parts, the cauterization of wounds, the suspension of a hemorrhoidal flow, or general surgical operations, electricity is one of the best remedial agents known ; but the profound ignorance of the community on its methods of application, the determined bigotry of many of the medical faculty in opposing all advance or suggestion of advance in its use, beyond the narrow spheres of their own experience, and the strong and perhaps natural tendency to experiment with this force, so little known, so ill understood, all tend to diminish public confidence in its virtue, and render the uninformed cautious of submitting themselves to be tampered with by the professors of a comparatively unknown art.

From my own experience in the uses of electricity, I have entire faith in its scientific appliance, but an equally strong aversion to its exercise in unscientific hands. I do not claim infallibility for my practice of

electricity, nor do I apprehend I have done more than enter upon the first step of the vestibule which will conduct the race into the arcanum of the life mystery; but that which I do claim I found on experience, prove by living witness, and demonstrate by daily practice; it is this: that the methods of treatment given in this book will be found effective in subduing the several diseases to which I direct them as applicable; also, that numerous other complaints of far more important and complicated character will yield to carefully directed electrical treatments, and that with study and experience, continually strengthened by fresh unfoldments of electrical science, this life-giving fluid will in a few generations be recognized as the one grand remedial agent, and that its orderly applications in skillful hands will be found capable of curing every complaint that is curable, and elevating the human physique to the highest standard of which it is susceptible.

CHAPTER VI.

ELECTRICITY.

WHETHER electricity be a force, a fluid, a mode of motion, or, as I have claimed for it, the actual life of things,—the real original element in which resides the sum of all forces and motors,—is not relevant to our present purpose to discuss further. We are about to consider only some of the modes in which electricity has been known and is now exhibited, and more especially in regard to the machinery by which it becomes most applicable to therapeutic purposes.

"Electricity" is a term derived from the Greek word *elektron*, and at one time it was applied exclusively to designate the product called amber, which abounds on the shores of the Mediterranean Sea, and, from being found to possess in a very remarkable degree the property of attraction, was believed by the ancients to be endowed with sundry mysterious powers, even life, and something of the nature of *soul*. Amber is a fossil of a vegetable origin, or, more properly speaking, it may be regarded as a fossilized gum.

Under the influence of friction its attractive power is very remarkable, and those now engaged in cutting it into the form of ornaments are found to become so subject to nervous excitations in the process of their work that they are obliged to change the pieces they

are employed upon constantly, in order that the frictionized quality of the substance may subside.

Amber and its peculiar powers are frequently mentioned by classical writers, more especially Thales of Miletus, and Pliny.

It would seem that other ancient writers also were acquainted with the properties of amber, and the superstitious awe with which it was regarded by the Greeks and Romans caused them to associate it with the famous Magnesian stone, so frequently alluded to in classical writings, and used, no doubt, as the moderns would now apply the loadstone or any natural magnet.

The phenomenon of sparks being emitted from woolen clothing and hair in dry weather, as well as the electrical power of the gymnotus, are no new discoveries; but the systematic investigation of electrical force as a science did not seem to have been attempted until the year 1600, when Dr. Gilbert, of England, announced certain theories concerning the action of attraction and magnetism as derived from the loadstone and other minerals. Dr. Gilbert was one of the first scientists who suggested that the powers of magnetism were more effective in a cool, dry atmosphere than in one saturated with moisture.

There are many curious facts in nature to justify this theory, even the phenomenon of an ostrich-feather becoming strongly charged with electricity when it is held against the currents of hot, dry winds that blow at certain seasons over the deserts of Africa; this and many similar experiments prove that dry atmospheres, in connection with extremes of heat or cold, are the most favorable conditions for the action of frictional

electricity. It is entirely different in the production of electro-magnetism. Here every experienced medical electrician can testify that the presence of moisture on the skin is necessary to promote the assimilation of the electric currents with the organism.

Among the ancients, it was generally believed that the power of the loadstone was in some mysterious manner due to the influence of Æsculapius the healer, esteemed as a god in heathen mythology. The force evolved from the magnet, minerals, and crystals was also deemed a gift of the gods, and Apollo, Castor and Pollux, and Mercury, the "swift-winged messenger of the gods," were supposed to exert special influences in connection with magnetism.

Could we disentangle the legends of mythology from the indications of science and the half-formed speculations of philosophy, we should no doubt perceive that many of the occult principles of nature were sought to be embodied in the fabled deities of the skies. It is curious and not uninstructive to trace out the connection between mythical ideas and the discoveries of modern science; and the fact that the powers of the magnet were known and used so many centuries ago, throws much light upon the mysteries of ancient worship and the art of healing.

We need not reiterate any accounts of the progress elicited in electricity and magnetism during the last century, save to notice one or two leading points which bear upon the construction of the machines now found so valuable in therapeutic practice. The Leyden-jar was first used in 1748, and its power in collecting and discharging the electric element has

been thoroughly tested. Galvanism was named after Galvani, the originator of the galvanic battery, so well known in the realms of science. The voltaic pile was called after the constructor, Volta; but the increase of power and intensity procured through the pile is due to an increase of the number and size of the plates employed, rather than to any material difference in the quality of the force evolved.

The discovery of the close relations subsisting between electricity and magnetism, and the construction of a machine combining the properties peculiar to both conditions of the fluid, were due to the researches of Prof. Oersted, of Copenhagen, who contributed some valuable theories on the subject in 1819–20. Prof. Oersted demonstrated the fact that when the two poles of a galvanic battery were united by a conducting wire, and this wire was brought into proximity with a magnetic needle, the latter tended to turn at right angles with the former.

M. Arago supplemented the researches of Prof. Oersted in many important directions. He showed that the wire joining the two poles of a galvanic battery was capable of imparting magnetism to iron filings whilst the battery was in action. Again, Ampère carried forward the progress of discovery, and proved that two parallel wires transmitting currents of electricity in the same direction attract each other, whilst similar wires transmitting currents in opposite directions repel each other.

From this Ampère evolved his remarkable hypothesis explanatory of the laws of electro-magnetism, viz., "Currents moving in the same direction attract, and

in opposite directions repel, each other." Again he says, "The magnetism of a bar of iron consists of currents of electricity revolving at right angles to the length of the bar around each particle of the metal."

Prof. Henry, of Washington, was probably the first scientist who clearly demonstrated the application of the above-named theories in the construction of the electro-galvanic battery. In the machine devised by the professor, he caused a coil of wire to be wound round a bar of iron bent in the form of a horse-shoe; this wire he connected with a galvanic battery, and the result was the generation of a powerful current of magnetism.

In this connection we must not forget to mention the discovery of Prof. Faraday, who claimed that magnetic properties are the attributes of all bodies, and that the currents run either in the direction of the greatest length, or at right angles with the length of a body, and this second current is named "diamagnetic."

In 1802 M. Coulomb, a French *savant* of great eminence, conducted some interesting experiments by the employment of a glass receiver, from the top of which he suspended a silk fibre, attached to the substance to be examined. We need not repeat the details of his experiments in this place, as they belong more immediately to the department of mechanics than that of therapeutics.

For a still further elucidation of the principles developed in the construction of batteries adapted to medical treatments, I shall now give several quotations from the works of Dr. Jerome Kidder, whose machines

and instruments, as I have before stated, I find to be the very best that I can apply to the cure of disease; in fact, I have adopted them solely in my practice, after having tried many others with far less favorable effect. Dr. Kidder's experiences in the evolvement of magnetism, galvanism, and combinations of electric force, have been long and faithfully tested; and although there is still so much to learn, and so much to improve upon in every direction, the scientific suggestions contained in his writings are most valuable and instructive.

On the existence of a different quality in the currents he evolves from his batteries, Dr. Kidder says:

"Currents of different qualities have not only different characters of sensation, and different effects on muscular irritability, as recognized by all who have carefully scrutinized in regard to these varied electrical phenomena, but also one quality even when so weak in power as not to produce any pain, but rather a pleasant sensation.

"It must not seem strange to find electricity produced in many different qualities to have varied effects. There are, indeed, other facts recognized as true, and which might seem stranger still; for it is well known to all chemists that the same proportion and kind of atoms may form substances so different in their nature as to be recognized as entirely different substances. For example, spirits of turpentine and oil of bergamot are identical in composition, being composed of ten atoms of carbon and eight of hydrogen, and the difference is recognized as merely that of the arrangement of the atoms. Also light is recognized as the effect of vibrations of wave motions in the ether, which is every-

where; and the different colors result from the different lengths of these waves. (See Prof. Draper's 'Chemistry,' and other scientific text-books.) And yet, even the difference in the character of the vibrations or wave lengths of the ether gives a difference in their chemical effects; for, indeed, it is known to be chiefly the yellow ray which causes the absorption of the carbon from the carbonic acid gas in the atmosphere into the solid form of a tree, by the influence of the sunlight falling upon its leaves. And it is the indigo ray which is chiefly concerned in causing hydrogen and chlorine to unite by passing light through a glass vessel containing a mixture of the two gases.

"Also, sound results from vibrations in the atmosphere or other media. Yet sounds may have differences in pitch, and also differences in qualities of tones having the same pitch. Its effects are what the spirit of man receives as jarring discord or sweet harmonies, and successions and qualities of tones, that inspire the emotions of courage and hope, or produce solemn and mournful feelings.

"Considering the fact that mere variations or modifications in vibratory or wave motions produce differences in effects, we should not think it strange, but should rather expect that the magnetic influence which excites the electricity in metallic helices would produce currents modified in qualities, by varying the physical condition of those helices; for by varying the helices we vary the medium of vibratory or wave motions resulting from polarizations, whose phenomenon is electricity."

These statements, based as they are upon scientific

analogies, are quite in harmony with my own experience, in which, during many past years, I have amply demonstrated that I *do* find in Dr. Jerome Kidder's batteries the six and nine different currents or *qualities* of current which he claims, and that these varying qualities of the electric force are particularly effective in treating different kinds of disease. We often hear the expression used, "Electricity is electricity; and although we may increase the tension or quantity, there can be no difference in the *quality* of the force." Now, it is precisely on this point that I take issue with the *vox populi*, and precisely for this reason that I have contended, with what might else seem to be such obstinate tenacity, for the use of Kidder's six and ten current batteries.

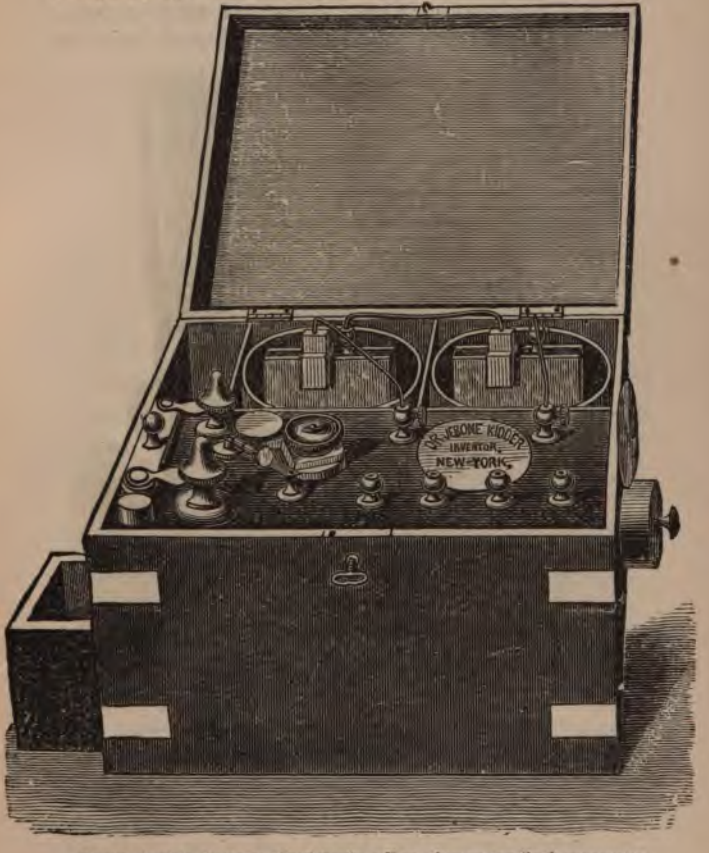
That which we must all admit to be modifications of the force, I claim, in addition, to evolve a variety in the quality; and it is in this sense that I indorse the claim of the manufacturer when he says, "The terms *quantity* and *tension*, as applied to electricity, do not express the real distinction in the qualities of electricity, and that is one reason why the terms are so generally misunderstood when thus used. The term *intensity* is often misused for power, but the difference is as plain as the difference between *loudness* and *pitch* in regard to sounds. A musical string *conditioned* for a given pitch *does not change that pitch* by a greater or less force of the blow causing it to vibrate; it simply changes its *loudness*. And in regard to electricity, the magnetic force upon the helix determines the power or strength of the induced current; but the intensity or tension, that is, *quality*, is determined, not by the amount of

magnetic force upon the helix, but by the *physical construction of the helix itself.*"

It is to be lamented that the study of electricity does not form an essential feature in the education of every medical practitioner. So many of the most eminent members of the faculty are now using it, and its admission to the hospital is becoming so general, that it seems strange and anomalous to find the discovery of its powers and possibilities left to experimenters rather than taught as a science. During my long years of practice in New York, I was favored with the patronage of many of the medical faculty, who sent such patients to me as they deemed likely to receive benefit from my special forms of treatment. Let us hope that the time is not far distant when the science of electrical therapeutics will form a necessary part of every medical student's education, and the hap-hazard administration of this great and potential force, as potential for evil as for good, will thereby be taken out of the hands of charlatans and mere experimenters. For the benefit of those who desire to know the nature of the machines which I have found so successful, I have procured, by the courtesy of Dr. Jerome Kidder, plates of the three batteries I most constantly use. I have also added a plate of the cautery battery, manufactured by Dr. Kidder, and said to be admirably adapted for surgical purposes. To those experienced in electrical treatments, the case of instruments which Dr. Kidder prepares for my use, will also be found essential, and specially adapted to internal applications.

Dr. Kidder publishes descriptions of his machines with a directness and simplicity which may, perhaps,

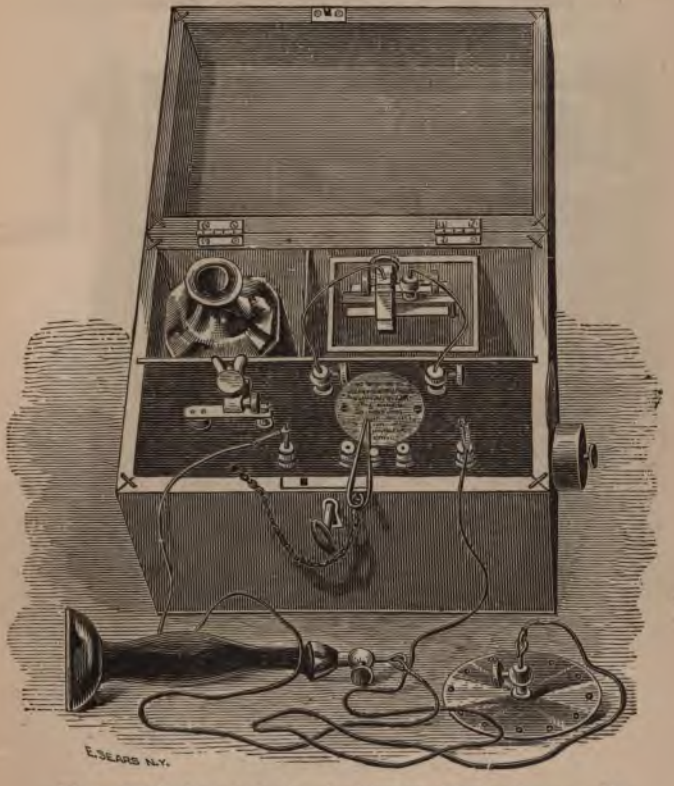
afford a better clue to their understanding than more elaborate treatises. I shall, therefore, quote some of the paragraphs which delineate their nature.



Large double battery physician's office electro-medical apparatus, having nine currents, varying by the combinations of four differently

constituted coils, with current-changer to reverse the direction of all the currents. This machine has five posts, and arrangement to throw the second coil also into the primary circuit, but these are not shown in this engraving. Polished walnut case, with brass-bound corners, and drawer underneath the helix. Size of case, 10½ inches long, 9 wide, and 7½ deep. Price, including handles and sponge-holder, $45.

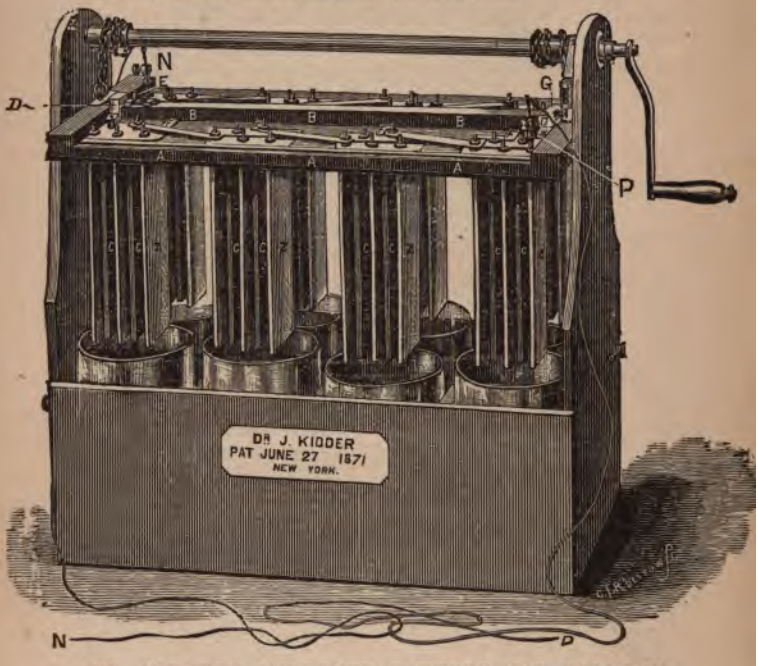
Physician's visiting electro-medical apparatus—six currents, double stopper battery, with rubber stoppers, coils arranged as in No. 4—can be carried without spilling the fluid. Polished mahogany or walnut case, 8 inches long, 6¼ wide, and 6¾ deep. Price, including handles and sponge-holder, $25.



Electro-medical apparatus for physicians, and for family uses. Has six qualities of electricity by varied combinations of three coils, each coil from the first being of longer and finer wire. Also arranged to use either one or two coils in the primary circuit, by a simple method of closing the second coil also in the primary circuit. This is the apparatus most in demand, and is very effective to cure disease.

There is sometimes demand for a still larger range of effect; and to meet this demand a four-coil helix is furnished, which makes

nine currents from the different combinations produced by varying the two posts selected for the positive and negative.



DR. KIDDER'S IMPROVED BATTERY FOR GALVANO-CAUTERY.

PATENTED JUNE 27, 1871.

It is known that the ordinary cautery batteries will not heat both a short and thick platina wire, and a long and fine one. Dr. Kidder's improved battery has a compound bar, which, being placed or removed, will cause the battery in the one case to heat a short and thick platina wire, and in the other case to heat a long and fine wire, which are different effects not accomplished by any other batteries unless they are an infringement on Dr. Kidder's patent. This battery consists of eight cells, each of which has 162 square inches surface of

zinc, and 108 square inches surface of carbon. A circuit-closer, conveniently used by the foot, accompanies each battery; for it is preferable thus to relieve the hands for more freedom in the use of the cautery instruments. By doubling, trebling, etc., the batteries, and connecting them with similar bars, an amount of power for any possible use can be obtained.

Besides these instruments, Dr. Kidder has invented and patented numerous appliances for the medical use of electricity, all of which will be found to be important adjuncts in its application.

Since the second edition of this work was issued, Dr. Kidder has substituted a switch and two small posts for the old prong and blind post. The action of the batteries is the same, the new mode being more convenient. I note this change to avoid confusion. The left or inner post connection is the weaker current, the outer post the strong current.

CHAPTER VII.

THE RATIONALE OF CURE—ELECTRICAL TREATMENTS.

I HAVE already sketched out my views concerning the urgent necessity of applying electricity, as a remedial agent for disease, with the utmost caution, and all the scientific acumen we can command in our present rudimental knowledge of the art. I will again refer to the fact that in Dr. Jerome Kidder's electro-magnetic machines I find combinations which furnish forth some six and ten currents, according to the size and construction of the battery I use. All the methods of treatment I am about to describe then must be understood as applying exclusively to Kidder's batteries; and I do not pretend to answer for the result of the treatments herein advised if attempted with other machines. I make this stipulation in the total absence of any personal interest in the manufacture of these machines, except in so far as I find them particularly applicable to my methods of practice.

My treatments are invariably preceded by a diagnosis, made through my special mode of electrical cranial application, because I find the fallacy of accepting the symptoms described by patients as a reliable indication of their states. This diagnosis discovers to me conditions which symptoms do not reveal; and whilst I am confident of penetrating the causes as well as the effects

of the disturbances I thus examine, I can find in no other way a guide-book equally reliable.

The diagnosis completed, the next step is to determine the currents to be used, the strength of those currents, the frequency of the application needed, the proper points for contact, and the changes which the organism requires in difficult or complicated cases.

For many years past I have found the electric vapor-bath a most efficacious, as well as rapidly acting adjunct of my treatments. The use of water-baths in connection with electricity has long been adopted both in America and Europe, and as I deem it the part of wisdom to "prove all things" before I hold fast any as good, I have carefully tested this method as well as the dry applications.

In neither instance have I found the same effects produced as by the exposure of the whole surface of the body, head and face included, to the action of the electric vapor-bath. There are many instances in which this treatment can be dispensed with, but in others, the effect of the electric vapor-bath is almost magical, and its necessity as an adjunct of my system in certain cases has been fully established.

I cannot, of course, present in this volume anything beyond a few general directions for the treatment of such diseases as would, under ordinary circumstances, be ranged in the category of domestic practice. In fevers, tumors, cancers, complicated forms of disease, fractures, or surgical cases, the experience of the skillful practitioner is demanded; and though this book is written for the express purpose of extending the hidden mysteries of physiological art from the college to

the home, in the present imperfect and experimental understanding of electricity I should not feel justified in furnishing an excuse for unscrupulous pretenders to tamper with my system in highly momentous cases.

I shall now assume that the reader is in possession of one of Kidder's six or ten current batteries.

The former will be quite sufficient for carrying out any of the following directions:

Standing facing the battery, we find four small posts, two on the right hand and two on the left of a fifth which divides them and is called a blind post. Commencing always from the left side of these posts, as if we were about to write a letter, we observe that each of the four posts divided by the blind one has a little hole on its upper surface for the attachment of the strings and electrodes. The blind post has no such hole, and its purpose is to serve for the insertion of a brass prong which connects the battery. This prong, when placed between the blind post and the one next to it on the left hand, gives a much stronger force of the currents than when inserted on the right-hand side of the post. The latter position is used when a very mild and soothing flow of the fluid is required. The posts with holes for the attachment of the strings are named *A*, *B*, *C*, *D*, commencing from the left hand, and omitting, of course, the blind post. The six currents are evolved by placing the connecting wires of the strings in any of the posts that may be required, and in these combinations six different currents are susceptible of evolution. In a battery which has the addition of another post, named *E*, situated at the extreme right of the battery, there are ten currents

obtained from different combinations. Our directions in this book, however, only include six.

At the right-hand end of the machine is a long tin piston, the use of which is to increase or diminish the strength of the different currents as it is pulled out or slid in. The farther it is drawn out, the stronger becomes the force of the current; the reverse of this action is sufficient to reduce that strength to the needed potency.

In connection with the battery, and supplied by the manufacturer, are a wooden sponge-cup or insulator, in which a sponge can be placed, two electrodes, and a pair of long strings inclosing the conducting wires in silk, worsted, or rubber sheaths, as may be desired.

In my practice I use also a set of eight plates varying in size and shape. These plates are made of a combination of metals producing in themselves a static current of electricity, thereby increasing the remedial effect of the battery. These plates are patented by myself, and can only be procured from me. Each plate is provided with a central groove or slide for the insertion of the copper pin which connects the strings with the battery.

I will here add that these plates should always be used with a damp cloth spread over their surface, one fold at least of which should intervene between the plate and the skin. The sponge also should be thoroughly moistened before application. Whenever, therefore, I direct the use of the plates, let it be clearly understood that I mean they shall be used with the smooth surface, covered with an intervening fold of damp cloth,

next the skin, and that the sponge when ordered shall be used wet. The strings will be found to have at one end a small brass pin, at the other a copper one, and it must be carefully noted that I claim the insertion of the copper wire in the battery is likely to be highly prejudicial to the patient; let the operator, therefore, in preparing the machine, be most careful to observe that the brass pins are inserted in the battery, and the copper in the electrodes, plates, etc.

It is only necessary to add, as a general rule, that the positive pole, whether in a sponge, plate, or electrode, should be always above the negative in point of position on the body. A descending current is thus obtained, and this may be regarded as the normal action of the currents in imitation of the nervous flow determined by the brain, the highest portion of the structure. There are many cases, as in paralysis, hemorrhage, the dispersion of tumors, the contraction of the cords, etc., where a reverse current is necessary, and the positive pole should be placed below, the negative above, in position on the body; but this treatment should never be attempted indiscriminately, nor without special instructions from an attending physician, or some competent person directing the application. With the same urgency I would enforce a charge never to apply the fluid over the surfaces of the lungs, whether back or front of the body, nor yet to the head, except as directed, to the base of the brain, or in making the cranial diagnosis; an act which of course depends on the skill, care, and experience of a person instructed in my own method, when the applications will be made with such precautions as will insure the subject from all danger.

NARCOTISM OR ANY POISON TAKEN INTO THE STOMACH.

Before or after drowsiness the following will prove generally infallible: *A*, just below the pit of the stomach in a small plate or in electrode placed in a sponge, *D*, at base of brain in sponge-cup, strong current; vibrate the piston in and out with rapidity and strength for five minutes, when, if the effect of an emetic has not been produced, place *A* directly on pit of the stomach and *D* back below the lungs on spine until vomiting is produced; stimulate the action of the stomach by strong black coffee in large quantities.

After vomiting is induced, place *C* at extremity of the spine and *A* in the hands for a few minutes.

Any symptoms of sinking or faintness occurring, place *A* base brain and *C* at feet for a few minutes, and prevent patient from sleeping. Send for a physician immediately.

MORBID CONDITION OF AND ENLARGED LIVER.

B in wide long plate across the upper part of bowels, so as to implicate the liver and spleen. *D* lower part of spinal column, twenty minutes; then place *D* at the feet, keeping *B* on bowels for five minutes. Treatment daily until relieved.

NERVOUS HEADACHE.

Where this is occasioned by excitement, grief, unusual mental effort, etc., apply the sponge-cup with *A*, base of brain, *D*, in electrode, between the palms of the hands, as strong as it can be borne without pain. Continue this for from three to five minutes; intermit; and if not relieved, repeat several times; intermit for the same length of time as treatment.

NEURALGIA, OR TOOTHACHE.

Apply sponge-cup with *B* over the part affected; apply *C* with a small plate (covered with damp cloth always) on the sternum (breast-bone) lengthways, with as much strength as can be borne, for five minutes. If not relieved, increase the time; and after ten minutes apply *A* to the face in sponge-cup and *C* in electrode between the hands for ten minutes.

SORE THROAT—ULCERATED, INFLAMED, OR DIPHTHERIA.

B base of brain with sponge-cup; small plate on front of throat with *D*, as strong as can be borne.

In violent attacks, use *A* in place of *B*, and renew the applications several times, at intervals of three hours, or longer, if relief is obtained. In these cases some judgment is necessary. In slight attacks, ten minutes' treatment morning and evening may suffice. Increase time and number of applications as the violence of the attack seems to demand it.

RHEUMATISM IN NECK, ARMS, OR CHEST.

Sponge-cup at base of brain with *A*, electrode with *D* between hands. If this application is felt unpleasantly strong, place the switch on the weak side for fifteen minutes. Then place *D* in small, narrow plate lengthways over the stomach, fifteen minutes. Regulate the strength to suit the feelings; and if the attack is obstinate, renew it twice or three times a day.

RHEUMATISM IN LOWER EXTREMITIES.

D in a large plate beneath the feet, *A* in a smaller plate across upper part of abdomen, fifteen minutes.

If the pain is in the loins, as in lumbago, place *A* above the part and *D* below the feet. If in the shoulders, place *A* in a plate lengthways between the shoulders, or rub the sponge-cup down the spine.

STIFF NECK.

B with sponge at part affected, *D* on small plate on the throat. Switch weak or right side, until relieved.

CROUP.

A at base of brain, *D* on stomach lengthways, five minutes; then *D* beneath the feet and *B* to base of brain, five minutes. With first currents, place the switch on the right side; and in second currents, remove it to the strong side; repeat these treatments, at intervals, until relieved.

WHOOPING-COUGH.

A in sponge-cup base of brain, *C* in plate on stomach, fifteen minutes. *B* in sponge-cup at throat, and *C* still on stomach. Switch right side; repeat treatments, till relieved, at intervals.

INFLUENZA, COLD IN HEAD, ETC.

A base of brain, *C* to stomach; change *C* to feet, and then place it in electrode between the palms of the hands. Continue each current about ten minutes.

SLEEPLESSNESS.

In the absence of an electrical vapor-bath, *B* base of brain, *C* between hands. Switch right side, fifteen minutes.

Another treatment for sleeplessness is *B* base of brain, *C* to loins; also *C* below the knees, above the calves of the legs. In the latter treatments, switch left side, fifteen minutes.

COLD FEET.

Large plate with *D* under feet, *B* base of brain, twenty minutes; then place *D* between the hands in electrode. *B* still to base of brain, twenty minutes.

BURNS, BRUISES, SCALDS, CUTS.

D in electrode in water; immerse the injured part in the same water, and place *B* above the injury.

If the part cannot be immersed, place folds of wet cloth across it, and pass the electrode or sponge-cup with *D* over it. *B* above the part on plate. For thirty minutes.

FELONS, GATHERINGS, BOILS.

If on fingers or extremities, immerse the part in water and place *D* in electrode in water. Tie or bind on *B* in plate, above the part, for twenty or thirty minutes. If immersion is not possible, place *D* below the part and *B* above, in sponge-cup and plate, with a strong current.

SPRAINED ANKLE.

Immerse electrode with *D* in a foot-tub with blood-warm salt and water. Attach a plate or band with *A* above the sprain; use a strong current, and repeat at intervals. For thirty minutes.

CONSTIPATION.

Wrap the electrode with *B* in a sponge, and sit upon it; then place *D* in sponge-cup, and knead the bowels thoroughly for twenty minutes. Treatment daily.

DYSENTERY AND DIARRHŒA.

C with plate lengthways up and down stomach; *A* with plate over the lower part of bowels for twenty minutes. In this, as in the directions for constipation, the poles are reversed, the positive *A* being below, the negative *C* above. Repeat until relieved every two hours.

BLEEDING OF THE NOSE.

A between hands, *C* on plate base of brain. If not checked in five minutes, remove *A* to throat, front part.

FOR COLIC OR CRAMPS IN STOMACH.

Wrap *A* in electrode with sponge or cloth, and sit upon it; *D* in sponge-cup, and knead the bowels with a rolling motion until relieved.

PILES, HÆMORRHOIDS, ETC.

A in electrode wrapped in sponge, and sit upon it; *D* in sponge-cup, passed down the spine for twenty minutes. Daily treatment.

In the few directions given above I have furnished a plan of treatment which, with judgment and care, may be used in every family where the aid of a good electrical practitioner cannot be obtained. I have mentioned only such simple cases as may be of most frequent occurrence, and such as can be treated with safety and effect. It is needless to reiterate my deep conviction of the necessity for all persons of mature years becoming acquainted with their own structures and the general principles of electrical applications.

In chronic cases, whether of tumors, cancers, fevers, internal or external injuries, in fact, as before stated, in all serious and complicated conditions of disease, no general directions will apply, and nothing short of long experience and scientific skill will justify the use of the battery. Again, there are many diseases and weaknesses incidental to the female organism for which general directions cannot safely be given, and in the treatment of which special and most careful methods should be used. A reference to the few cases which the limitations of this volume will permit me to introduce, will show what fearful and complicated diseases in the female organism can be cured by electricity. Chronic conditions, internal tumors, displacements, cancerous and fibrous growths, and states of suffering which have baffled all other forms of treat-

ment, have yielded rapidly, surely, without pain or exposure, to the action of electricity scientifically applied. Some of my records in this volume, and others withheld from lack of space, are startling in their minutiæ of suffering, hopeless agony, and the triumphs wrought by the marvelous action of electricity. The number of respectable names which I am permitted to cite in evidence of the truth of these narratives, but, above all, the living testimony of the multitudes who have passed from my operating-rooms made whole, when all hope had failed, and the fresh cases which every day's experience presents, justify me in making the broadest claims for my system, and insisting that it can master every form of disease that is curable.

I am now about to close my treatise on disease by prescribing a remedy for one of the most baneful, and, as it has hitherto appeared, one of the most hopeless conditions in which humanity can be plunged: I refer to the taste for intoxicating liquors.

Intemperance may arise from the evil influence of loose associations; the baneful practice of taking stimulating liquors at social gatherings, or in what has been most erroneously called "good-fellowship." It may be the result of inherited tendencies, or the fatal desire to drown care, grief, disappointment, or any kind of physical or mental pain, in the fever of unnatural excitement; but from whatever cause it may arise, at the point where it masters the reason and becomes a habit it is also a disease, and either in the shape of an unconquerable yearning for excitement, or a wretched sense of morbid depletion, forces its miserable victim

on the downward course, into the frenzy of delirium tremens, and the final degradation of a drunkard's grave. In whatever stage we find the man or woman in whom the passion for drink has grown to be a habit, we shall invariably realize that the stomach is either in a condition of inflammatory fever or partial paralysis. In these alternating states of misery, the digestive apparatus offers a fresh stimulus to urge the unhappy inebriate on his course of destruction. To him it seems that he must drink or die. In this deplorable condition of the organism the reader will recall my theory of disease and cure, and ask whether any other remedial agent but the great motor, which is itself the life, can restore the lost equilibrium, reduce the inflammation, and quicken the paralyzed muscles into fresh action. What else, indeed, can neutralize the poisonous canker of the mucous membrane, and restore the healthful flow of the life currents when they have been forced into unnatural channels?

Whether there is any other cure for this worst form of physical and mental degradation, I am unable to affirm; but this I do know: that having been all my life interested in the temperance cause, and particularly so since coming to Philadelphia, and witnessing the noble work performed by Mr. Charles Heritage in the "Temperance Blessing" for the reformation of the inebriate, I have esteemed it my pleasure and duty alike,—to strengthen his hands by my treatments; and in numerous cases in which I have cheerfully administered my remedy in aid of the victims who had become too weak to help themselves, I have never known my method to fail in effecting a cure.

That similarly good results may flow out of every sincere attempt to substitute health and blessing for disease and cursing, and the pure lightnings of nature for the impure fires of alcohol, is the aspiration with which I now make known my remedy to the world.

INFALLIBLE CURE FOR DRUNKENNESS.

Place *B* lengthways in a plate on the stomach. *D* on base of brain as strong as can be borne, fifteen minutes. Change *D* from base of brain to palms of the hands, five minutes; if too strong, diminish with the piston. Let the patient eat a dry cracker during the treatment. At meals, drink little or no water, but take a cup of strong coffee sweetened to the taste, but without milk. Eat also slices of bread toasted very brown. Carefully abstain from any drink except this coffee and a little water. Keep dry crackers about the person, to eat whenever a sense of thirst arises. Continue this treatment with electricity and diet for from three to seven days, and the cure is effected.

MEASLES.

WHEN first symptoms, watery eyes, rasping cough and fever, commence. By regulating the temperature of the room, average 75 degrees, place *B* at the base of brain in sponge-cup; *C*, long slim plate on the spine fifteen minutes; then place *A* on throat and *C* on the ankles or feet, strong enough to be perceptible to patient fifteen minutes longer, switch left side. Repeat treatment three times daily during the malady.

CHAPTER VIII.

HYGIENE.

PART I.- GYMNASTICS—THEIR USE AND ABUSE.

THE plea which I have so often urged for the observance of hygienic practices cannot be too earnestly insisted on by those who love their kind, and would disinterestedly save them from the long and dismal catalogue of diseases for which the physician's art has become so fatally indispensable. If we were writing a book in the interests of the medical profession, we could act no better part towards our clients than to put the world upon just such methods of life-practice, diet and clothing, as conform most closely to the customs of modern fashion, such as late hours, crowded assemblies, apartments lighted by gas and overheated by crowds, ill-ventilated dwellings, tight lacing, heavy skirts, bare arms and necks, unnatural weights imposed upon the aching head by chignons; stimulating drinks, and ill-cooked meats. Civilization is often charged with the onus of originating diseases which never appear in the primitive conditions of savageism; but we may assure ourselves it is through the abuses of civilization, not in its uses, that the human organism becomes deteriorated; also, that the careful observance of hygienic

laws would be amply sufficient to maintain the race in the finest conditions of physical health, at the same time that civilization was working its highest refining processes upon the intellect and manners.

Let us commence our reformatory methods of living, then, by a careful study of hygienic laws,—remembering always that the time we allow to the preservation of health we shall more than regain in the increased amount of strength and vital energy with which we shall be enabled to fulfil whatever life-duties belong to us.

One of the most essential methods of preserving equilibrium in the circulatory system is the occasional performance of such movements as will bring the whole of the nervous and muscular apparatuses into play.

Even in ancient times, when there was no such excessive demand upon men's brains as our present high-strained civilization imposes, gymnastic exercises were considered a healthful and necessary concomitant of educational systems, and their practice was enjoined upon the male population of Greece and Rome as a means of maintaining sound health and mental equilibrium.

In this age, when physiological science has taken such a deep hold upon the popular mind, it would be superfluous to dwell upon the necessity of engrafting physical culture upon our educational systems; and yet men and women of high intelligence, fully informed of the physiological results accruing from excessive mental action, and the imperative demand for some compensative system of physical culture, continue to preach physiology, but to neglect one of its most im-

portant items, and too often stimulate the intellect to the very verge of insanity, and wholly neglect the observance of those exercises that would act as a safety-valve for the excessive tension of the brain and nerves.

Walking in the open air is of course a healthful and invigorating exercise, and should be practiced both by young and old; but the act of walking, only sets the lower extremities in motion, and, as they have to carry the whole weight of the body, the consequent fatigue of this process in many instances counterbalances the good which would otherwise be effected.

As to dancing, although it calls into play a larger proportion of nerves and muscles than walking, its hygienic results are so often counteracted by the adjuncts, which fashion necessitates, in the shape of crowded ill-ventilated ball-rooms and the pernicious custom of *undressing*, instead of dressing, for the dance, that the motions which favor health are more than neutralized by the evils attendant on their performance.

Plato informs us that gymnastic exercises were universally practiced about the time of Hippocrates, as a part of medical treatment; also that they were prescribed by the laws of the various states of Greece, as a means of counteracting the tendency to effeminacy which rapidly grew upon such nations as were rich and luxurious in their habits. Public buildings were erected at the expense of the government in many of the Grecian states for the practice of gymnastics. The first of these was built at Lacedæmon, and several of a still more magnificent character were erected at Athens and Rome.

The Romans, whose gymnasia were more splendid and commodious than those of any other people, introduced the custom of erecting baths in connection with their halls for exercise; and this desirable addendum was subsequently adopted in other countries and all the buildings devoted to physical culture.

The exercises of the classic gymnasia included wrestling, boxing, running, dancing, the enactment of pantomimic plays, leaping, hurling, and playing a game called quoits.

The object of these exercises, and the high estimation in which physical strength and agility were held by the ancients, may be learned from the fact that many of the highest offices and places of distinction were conferred upon those who excelled in the performance of athletic sports.

The Olympian Games and other public fields of competition were undoubtedly established by the legislators of Greece and Rome for the purpose of preserving among the youth of those nations that just equilibrium of mind and body which health, promoted by physical culture, is so efficacious in insuring.

The diminution of gymnastic exercises in popular favor by the Greeks and Romans arose at last from the abuses which excessive devotion to their performance originated. Physical culture prevailed over mental. Muscle was developed at the expense of brain. Athletes and gladiators were preferred to statesmen and thinkers, and in process of time the reaction of popular opinion set in, and restored mind to the seats of power, and the culture of physique to its true status of a hygienic necessity.

The only legitimate object of gymnastic exercises is to call into play the entire set of nerves, muscles, and joints, and that without exaggerating any part by unnatural tension, strain, distortion, or excessive fatigue.

Ten minutes is a sufficient amount of time to devote each day to such light, graceful, and healthful movements as are best calculated to call into action the whole frame and stimulate it without injury. The gymnastics, or I should say the well-studied movements, practiced under my own supervision by my classes, have invariably been found to promote health, develop strength, and impart graceful action, and that without exceeding a ten minutes' limit of time, including too, when expedient and attainable, the use of the sponge-bath. I cannot, in this treatise, pretend to give a manual of the movements best calculated to effect these desirable results. There are always sufficient opportunities open for the practice of light gymnastics, movement-cures, etc., and it only requires the community to appreciate thoroughly their valuable results to insure their universal exercise.

Part II.—Food and Drink.

To offer any remarks to intelligent men and women upon the necessity of regulating the quantity and quality of the food they consume, or to recommend special observance of the times and seasons when they should refresh their appetites with food, would be as superfluous as to insist on the value of physical culture. It is universally admitted that quite one-half of the dis-

eases that afflict the race, originate in dyspepsia, whilst dyspepsia itself is but the pathological indication of unphysiological methods of dieting.

Whilst the truth of these positions is so universally felt, it seems almost paradoxical to see rational beings perpetually living against knowledge, and continuing to indulge in the very practices which above all others their reason would most condemn.

The truth is that physiological methods in eating and drinking are so simple, natural, and easily understood, that astute persons are apt to deem them beneath their notice, think there is no science about them, and hence they become the most neglected of all the laws of our being. True, they are simple, but their very simplicity renders their observance imperative. They are natural, but they are also stern, and will not brook any unnatural interference in their action.

To lay down arbitrary rules as to what we should eat, drink, and avoid, would be as fallacious as to lay down rules for one kind of costume for all sorts of climates and occupations. Diet, like sleep, must first be adapted to the soil and climate in which we reside, and next, to the habits of life and temperaments of different individuals.

In cold climates there is greater demand for oleaginous food than in the tropics, and that because there is a greater proportion of combustible action required in the system to promote animal heat, and animal heat depends much upon the quality of the food we consume, and whether there is an adequate supply of oleaginous or fatty matters to promote combustion. In warm climates, where the evaporation is rapid and

the atmosphere more than supplies the demand of the system for vital heat, thirst is excessive, and there is an urgent desire to compensate for excessive evaporation by the imbibition of large quantities of liquids. Now, it is a well-known fact that this urgent desire for drink, so prevalent in hot countries, cannot be quenched by pouring fluids into the system.

These are taken up in the general circulation, and, as they retard rather than promote digestion, their tendency is to create feverish conditions, which increase rather than diminish thirst. To meet this distressing paradox, the kindly dispensations of a beneficent Providence supply the inhabitants of tropical climes with a profusion of those nutritious and succulent fruits which restore the healthful juices of the body without weakening the digestion by introducing too much fluid into the stomach. It has been proved, as a general rule, that the inhabitants of special climates are surrounded by just those articles of consumption which are best adapted to the conditions in which they live. The fruits, vegetables, cereals, and animal productions of every land are in strict harmony with the soil and climate that produce them, and those who live in normal accordance with their natural surroundings are generally found to present the best evidences of physical strength and healthful balance.

In Europe and America the generally temperate character of the climate, together with the varieties of natural productions, in the shape of fruit, vegetables, and animals, that are offered for man's consumption, suggest the propriety of using a mixed diet; and in this respect, as indeed in every other, physiological results

are most surely obtained by respecting Nature's promptings, receiving all her bounties thankfully, and appropriating them temperately to the use of the organism which she has surrounded with its most appropriate means of nourishment.

In a previous chapter, we have offered a sufficient number of arguments in favor of a mixed diet, or one that includes animal, vegetable, and some small proportion of mineral substances.

The formation of our three kinds of teeth, the compound nature of our organisms, made up of such a variety of tissues, and so many different primitive substances, all imply that an equal variety of elements are necessary to supply the waste and keep up the repair of our wonderfully constituted structures; and these theories are so far sustained by practice, that we find the highest types of the race existing in those lands where the inhabitants feed upon such a mixed character of diet, as is common in Europe and America.

Different organisms should always be considered irrespective of general rules, and individual temperaments should have the privilege of dictating the choice of such articles of food as experience proves to be most easily assimilated, and rejecting others obnoxious either to the taste or well-being of the individuals.

Notwithstanding the outcry that has been raised by some physiologists against tea and coffee, I cannot deem their moderate use objectionable, nor except them from the list of nourishing dietetics. "The cup that cheers, but not inebriates," must be admissible as a nervine in conditions of the organism that require acceleration of nervous power to enable Nature to perform her functions;

and in this category both tea and coffee, carefully prepared and used in moderation, are valuable accessories to the tables of civilization. There are more reasons than mere taste why tea should not be legislated out of fashion by the asceticism of physiological reform.

It lessens the wear and tear of the system, and the experience of many is, that tea assists digestion, helps to dissolve the food in the stomach, and thus obtains from a given amount, a larger proportion of nourishment. This is the rule in the use of tea. With plenty of food, tea is beneficial, because it is a powerful digestive agent; but where tea is taken without corresponding food to digest, it wastes the tissues of the body and lowers the vital powers.

Coffee is, in my experience, a still more beneficial beverage, used in moderation and prepared judiciously, than tea. And here let me remark that my advocacy of the use of coffee is always accompanied by the unlimited qualification that it shall be prepared in a porcelain and never in a metal vessel. The French, whose penchant for coffee, and skill in its preparation, have become proverbial, now admit that the use of metals in connection with coffee prejudicially affects its chemical properties; and I have found, by many carefully conducted experiments, that the most beneficial effects of coffee are prejudiced, if not actually neutralized, by the use of metal vessels in which to prepare or serve it up. These remarks apply measurably to tea also.

On the question of alcohol we cannot present the same palliatives, or indeed any at all; for whether we regard its use as the stepping-stone to the ruinous and

degrading vice of intoxication, or simply limit our view in respect to the physiological effects it produces on the system, we can find nothing to commend, and everything to deter us from classing it among the articles of consumption fit for civilized beings. Hardening to the coats of the stomach, totally indigestible, drying and consuming, although temporarily exciting, to the brain and nerves, inflammatory to the blood, and far too stimulating in its temporary effects upon the muscular system, we cannot point to one good effect in the use of alcohol.

Whilst volumes might be written on the evils of intemperance, far too little notice is taken of the pernicious effects of the use of alcohol, in any quantity or any form. In connection with this subject, we may call the reader's attention to a few quotations from the prize essay on the use of alcoholic liquors, written by Dr. Wm. B. Carpenter, the now acknowledged leader of physiological science in Europe and America.

This great authority says, "The most important physical change which the contact of alcohol effects in the softer tissues is that of corrugation, which change is entirely due to the difference in the capillary attraction of the tissue for alcohol and for water respectively. If animal membranes, etc., be placed in alcohol in a fresh state, thoroughly charged with water, there are formed, at all points where water and alcohol meet, mixtures of the two; and, as the animal texture absorbs much less alcohol than pure water, the first result is a *shrinking of the animal substances.*" Again: "Dr. Percy found that when animals are poisoned by alcohol introduced into the stomach, the coats of that organ become

so thoroughly imbued with it that no washing or maceration can remove it.

"The physical change just described must have an important influence upon the chemical relations of the tissues, since it is impossible that alcohol can be substituted, in however small a proportion, for their constituent water without producing a decided alteration in their chemical properties, which must disturb the normal series of changes involved in nutritive operations. . . . .

"No considerable change can take place, of a physical or chemical nature, in any of the animal tissues without disordering their vital properties also; and we have now to inquire into the mode in which these properties are affected by contact with alcoholic liquids."

Without entering further on the ground so ably and thoroughly traversed by the learned physiologist, it is enough to say that he completely routs the army of "moderate drinkers" at all points, and shows conclusively that injury, alike to nerves, muscle, strength of mind, and vigor of body, must result from the use of alcohol and fermented liquors in any quantity, however small.

On the proper modes and best seasons for consuming food, all intelligent physiologists must be agreed. In the first place, then, we must deprecate the custom of drinking quantities of any kind of fluid at meals.

On this point we refer the reader to our treatise on the digestive apparatus, and proceed to insist that from three to at least four hours should be allowed to intervene before one meal succeeds another, and food should

never be permitted to enter the stomach until it has been thoroughly masticated, to effect which process requires time, and that time should be given without stint and without interruption. A vast amount of nervous power is called into play in the processes of mastication, deglutition, and digestion.

If these are hurried through, and the stomach has to perform the process of reducing the food to chyme, as well as digesting it, this organ, faithful to its one function, will refuse the work, and cast the half-masticated food into the alimentary canal in an unprepared state.

The functions of the alimentary canal cannot be exceeded any more than those of the stomach,—neither will or can do the work of the mouth, teeth, and salivary glands; hence a mass of half-masticated food is submitted to the action of the liver, pancreas, gall-bladder, and lacteals, wholly unfit for blood-making purposes. The stomach becomes languid, the alimentary passages overcharged with bile, the lacteals weakened, the blood poor, the whole system degenerated, and finally given up to the demon of dyspepsia, and its long list of attendant ills. It is easy enough to see why our people, in their devotion to business pursuits and eager haste to accomplish so much in so little time, manufacture the demons of indigestion at every hasty meal they consume; nor can all the remedial arts they bring to bear upon themselves, restore to its normal condition of equilibrium a digestive apparatus once assailed by a regular fit of dyspepsia.

Another source of injury to the process of digestion arises from a system of bad cookery. Undignified as

we may consider the subject of cookery to be, and philosophical as we may deem ourselves when we affect to treat the details of cooking with indifference, we are proving in this country by sad and fatal experience, that our physical systems are degenerating under the compound action of many bad practices, among which we may fairly reckon the consumption of overdressed, hard, stringy meat, half-cooked vegetables, greasy gravies called dip, and quantities of half-baked hot bread, washed down by still greater quantities of indigestible ice-water. We cannot fail to notice the prevalence of dyspepsia and the early decay of the teeth in America: why then should we pass over in scornful silence the causes that lead to these deplorable results?

The French, with all the frivolity of which we accuse them, are surely more philosophic in regarding cookery in the light of a chemical science, than we are in disregarding it as a subject unworthy of attention, or delegating its performance to ignorant and careless hirelings.

I am well convinced that the haste, silence, and gloom in which we consume our meals, the utter want of chemical knowledge which we display in preparing them, and the unnatural haste with which we rush away directly we have swallowed them, and use up the nervous force essential to the process of digestion in all sorts of other directions, are influential causes in promoting that baleful condition of dyspepsia with which our people are fast becoming proverbially afflicted.

Still more injurious is the disgusting habit of chewing the foul poison called tobacco, with its debilitating

and unclean accompaniment of expectoration; added to this the pernicious custom of sealing every bargain or settling every argument over the fiery alcoholic cup, and we find causes enough which taken separately would readily account for the physical degeneracy of any nation, especially when they are practiced as universally as in America; but when we remember that bad food, bad cookery, the habit of hasty eating, cutting off all time and rest for digestive action, the custom of chewing and often of smoking in addition, spitting incessantly, and drinking in proportion, are so often combined in the practice of one individual, our astonishment should not be to see so many ailing, but to find any constitutions strong enough to resist the influence of such pernicious customs for any extended period of life.

CHAPTER IX.

HYGIENE—CONTINUED.

PART III.—ABLUTIONS.

IT would be impossible to overestimate the value of ablutions as means of promoting health, to say nothing of the influence such practices exert upon beauty of personal appearance.

"Hydropathy" may be regarded as an extremism in the use of water, and although the system is by some highly commended as a curative art, there are others who regard it (and not without good cause) as a dangerous method of practice. Without entering into the merits or demerits of hydropathy in its remedial action as it is commonly applied, we may commend the use of water for the purposes of *cleanliness*, not only as a necessary adjunct of civilization, but as one of the most essential features of hygiene, and one which claims an important place in this manual of health.

One very essential part of the life-processes is absorption, another evaporation. Both these procedures are vital portions of the economy of life, and both are perpetually transpiring in every living organism, whether animal, vegetable, or human.

The plants absorb dew, moisture, air, light, and heat, as means of repairing and building up their tissues, in

compensation for which evaporation is carried forward through appropriate conducting vessels. In the human organism, the skin is the special instrument through which these dual processes are carried on, and here too a wonderful array of conducting channels, or pores, pierce the cuticle in every part, for the purpose of promoting evaporation and absorption.

Experiments upon living animals have proved that any obstacle which intervenes to arrest the action of evaporation and absorption is fatal to life.

Does it not follow, then, that even a slight interruption of the processes whose suspension is death, must prove injurious to the integrity of the body in exact proportion to the extent in which it is permitted to act? If this is true, the necessity for promoting the healthy secretions and excretions of the body by ample and regular ablutions is at once demonstrated. To supply the waste of the tissues by food and promote the necessary act of carrying off effete matters through the ordinary channels of excretion, have become such established points in physiological practice that the first inquiries which the skillful physician institutes into the condition of his patient relate to his appetite on the one hand, and the regularity and abundance of the excretory functions on the other.

If the medical profession had but condescended to stoop to the combination of hygienic with therapeutic practices, it would have been an established item of the physician's duty to inquire if the scalp of the head was clean and its pores unobstructed by dandruff or other extraneous matters; if the skin were thoroughly cleansed every day, and every tiny perspiratory duct

was permitted free access to the outer air, both as a mouth to receive atmospheric influences and expel by exhalation the effete matters constantly accumulating in the system.

To whatever part of the skin we direct our attention, we shall find that kind nature has provided millions of little mouths for this mode of dual action. In whatever direction these avenues of ingress and egress are choked up by dirt, perspiration, or any extraneous matter, there the intentions of nature are defeated, and some kind of physical disability may be expected to ensue.

Hence the value of frequent ablutions; hence the duty of the physician to insist upon absolute personal cleanliness as a means of health, and the equally urgent necessity of individuals to practice it as a part of the law of self-preservation.

The wise ancients, especially in the East, where a tropical climate induces a quick and abundant evaporation, engrafted systems of cleanliness and purification even upon their religions. In India, Egypt, Arabia, Greece, and Rome, all the religious systems abounded with directions for the use of ablutions, as well as anointings and perfumes.

The followers of Moses and Mahomet may be cited as especial examples of the religious duty which was enjoined upon them in the practices of cleanliness and periodical purifications.

Why we should be behind our venerable forefathers in these most necessary and healthful processes, it is difficult to conceive; the fact is patent, however, that we—who call ourselves civilized—are far more lax in

respect to systems of regular ablution than those whom we contemptuously style "the heathen." Without seeking to account for this strange anomaly, we merely notice its existence, and, since we are no longer compelled to keep ourselves clean as a religious duty, let us take care to do so in a physiological sense, assured that though a cleanly body may not always be a healthy one, an uncleanly skin can never be healthy, no matter how coarse and seemingly vigorous the constitution may otherwise appear. Cutaneous disorders are sure to arise in connection with foul skins, and sooner or later the same irruptive conditions that were exaggerated under the burning skies of the East into leprosy and other terrible conditions of skin-disease, will find out and infect the forms of all who neglect the duty of personal cleanliness. If we are asked what kind of ablution we should most recommend, we should say, the use of a sponge-bath, or the careful removal of all cutaneous accretions, once at least every day, by the application of soap, water, and a good rough towel.

Bathing is not always expedient nor invariably strengthening, and, unless accompanied by smart friction, it is as liable to debilitate the frame as to cleanse its surfaces.

We have already spoken at large of the use—nay, the necessity—of the electric vapor bath as a curative agent in disease. It is also a valuable purifier, penetrating the pores of the skin with much more completeness than water, and carrying off its impurities with a more direct action than any other kind of bath.

Russian, Turkish, air, water, and fumigated baths

generally have all their special advocates; and sea-bathing, to those whose constitutions are vigorous or especially adapted to bear it—has been found an efficacious stimulant and a promoter of health; but as a simple article of hygienic practice, necessary to the processes of life, and attainable in every family under any circumstances, the use of good pure water, soap, and a daily sponge-bath, exceeds all other hydropathic practices in universal value.

Part IV.—Ventilation.

The imperative necessity for fresh air, pure air, and air sufficient in quantity as well as good in quality, is a demand which has been instinctively acknowledged as essential to the maintenance of human life and health in every age, whether savage or civilized; but it remains for modern science to demonstrate what are the circumstances under which airs are changed from their life-giving properties to poison; what are the constituent elements necessary to sustain life and promote health; and what physiological results are effected by the exclusion of pure air and the inhalation of that which is vitiated.

Atmospheric air is composed of one-fifth of oxygen, nearly four-fifths of nitrogen, a very slight but appreciable fraction of carbonic acid gas, and a trace of ammonia. The amount of oxygen thus inhaled is not only an essential element in changing the character of the blood in the lungs from venous to arterial, but it is also so important to the very existence of animated beings that to lessen its proportion is to deprive man

of health, and to abstract it in toto from the atmosphere would be to cause instant death. It is evident, then, that the nearer we can approach nature's wise provisions, and make such arrangements in our mode of living as will give us air to breathe as nearly resembling the combinations of the atmosphere as possible, the more surely we shall maintain the integrity of health and the soundness of intellect.

To diminish the quantity of oxygen in the atmosphere is to promote languor and debility. To increase it beyond its natural or normal admixture with nitrogen is to create excitement, insanity, or even death.

So to organize our dwellings and places of resort as to provide an atmosphere as nearly as possible at blood heat, and combining the same proportion of elements as is found in atmospheric air, should be the aim of social science and hygienic practice.

Every philosophical treatise of modern times on the subject of hygiene has recorded at sufficient length the evils arising from the lack of ventilation in our public and private buildings, ships, and churches. The worst effects, however, that can be produced on the lungs arise from the necessity of breathing over and over again the airs and exhalations that proceed from the human body.

It is a well-known fact that the poisonous effluvia of coal or coke gas, tobacco, the fumes of heated metals, or mephitic vapors, are all less pernicious in their effects upon the system than the accumulated emanations given off from a dense crowd of human beings. Besides the waste matters exhaled from the body through watery vapors, the expirations of every breath, as we

have shown in our anatomical treatises, are loaded with carbonic acid gas, and this, it is well known to every school-boy, is fatal to life in any great quantity.

To all other pernicious exhalations, provided they are not inhaled to excess, the lungs may ultimately adjust themselves; and it is proved by the example of miners, charcoal-burners, engineers, stokers, and mechanics working over heated furnaces, that the suffering lungs may in time adjust themselves to these unhealthful conditions, and life, although vitiated and poisoned with different forms of disease, may be prolonged even to old age; but this is not the case with exhalations evolved from the human body. The experiences of the dreadful slave and convict ships, the horrors of the black hole of Calcutta, and numerous other historical tragedies of a similar kind, tend to prove that the darkest, most fatal, and rapid poison that can sap the source of life, or suddenly extinguish it, is manufactured in the human body; that is, when it is condensed in over-crowded apartments or closely-packed assemblies, —in any condition, in fact, where the needful supply of pure atmospheric air is unnaturally withheld.

As it is needless to point further to effects which history has recorded so abundantly and physiological observation demonstrates with each hour's experience, we shall close our subject by pointing out the best methods of ventilation.

As a general rule, every apartment, large or small, crowded or empty, public or private, by night or by day, should have some direct vent for the admission of atmospheric air. As hydrogen gas ascends and carbonic acid gas descends, and as these two elements

constitute the poisons most injurious to human life, every apartment should also be provided with two vents for the escape of these impure airs, one near the ceiling, the other near the floor.

There are many objections urged against every known method both of heating rooms in winter and of cooling them in summer, but the admission of some proportion of atmospheric air, obtained directly from without, and not merely filtered in from chinks and crannies, should be held as one indispensable feature of life, whilst the provision for expelling foul airs both from above and below, in any room tenanted by one or more persons, is another equally imperative item of hygienic law. In factories, school- and work-rooms, and machine shops, still more stringent provisions should be made for ventilation, whilst in the sick-room and sleeping-apartment the most careful arrangements for changing the air and vitalizing the atmosphere with oxygen are requisite.

We find in every school-book now printed on the subject of hygiene, as well as in an abundant supply of treatises continually issuing from the press, fully sufficient suggestions for special methods of airing our chambers, dwellings, and public buildings; nor need we add, to the stock of literature with which the age is supplied, any particular directions on this subject. We may, however, with advantage quote a few lines of a popular, though anonymous, treatise on domestic hygiene. Our common-sense matter-of-fact author says,—

"It is of great importance that sleeping-rooms should be frequently and thoroughly ventilated. There

are many European practices, which in this particular are superior to our own. In Italy, for example, it is the custom to take care that a separation of all the clothes that have been used during sleep be effected, and thus separately suspended from the windows, so as to get the benefit of free and full exposure to the purifying influence of the atmosphere. Many are the contrivances of modern ingenuity for the purpose of insuring an unobstructed circulation of air in rooms, but where there is a door, a window, and a chimney-place, all these contrivances may be dispensed with. Let the windows of the bedroom, however, be so constructed that they can be drawn down as well as pushed up, and remember that a sick-room should be kept very sweet and airy; there should never be a close smell in it; if the weather is warm enough, let the door or window be open; if cold, let there be a small fire; the chimney should never be stopped up."

Another hygienic rule, which we may suggest in this place to advantage, will be found in the following quotation from my own lectures on the subject of popular customs in dress, ventilation, etc.:

"Never retire to rest in any of the under-garments that have been worn during the day. Spread out and divide separately each article of clothing, and expose them all to the action of the air. To change them every day, or too often, debilitates the system; to wear the same garments night and day is an equally uncleanly and unhealthful custom. Let it be most carefully avoided."

Commonplace rules of this kind seem scarcely to comport with the dignity of a medical treatise, but we

can never too strongly insist on the fact that hygiene is prevention, medicine *not always* cure. If preventive systems were as freely adopted as medical arts, the latter would soon cease to be called into requisition. As the true dignity of life, therefore, consists in its use, we do not deem the smallest item which contributes to promote that use an undignified subject for live men and women to study, or the good physician to write about.

CHAPTER X.

HYGIENE—CONTINUED.

PART V.—DRESS.

As an article of hygiene, dress exercises a far more important influence than we are commonly aware of.

Fashion of course must be respected, so far as the painful impressions produced upon the eye by marked and obvious departures from her arbitrary rules are concerned: but fashion is seldom a good physiologist, and one thing is quite certain, that she issues her mandates and imposes her commands totally irrespective of physiology; and whether the two accord, is a mere matter of accident, not a question of design.

Allowing, then, that the prevailing taste of the day should be so far consulted as not to offend the eye by any abrupt or violent infractions of popular custom, dress should be arranged upon physiological principles, just as strictly as diet. Our first care should be to adapt clothing to the seasons, so as to avoid undue excess of heat or cold. We should next observe that the skin requires a special covering in its direct proximity, calculated to absorb the perspiration and exclude the air from striking upon its sensitive surfaces.

For this purpose woolen garments, spun or knitted, have generally been used in the shape of under-

vests and drawers. Instead of woolen, I would substitute canton flannel, or, where practicable, spun silk, the latter material being a non-conductor of electricity, and therefore better calculated to maintain the electric forces of the body than any other fabric. To mothers having the care of infants, no less than to fashionable ladies, whether young or advanced in life, I would urge the danger of exposing the neck and arms to the direct action of the air without some interposing covering.

So necessary do I deem caution in this respect, that I constantly advocate in my physiological lectures the use of a chest-protector, made of wash-leather or some soft material of a similar character, placed over the surfaces of the chest and back, both of which should be worn from the fall of the year to the early spring. Where these chest-protectors are adopted as a regular article of dress during the winter, a large percentage of the throat and pulmonary complaints that prevail to such a destructive extent are avoided. Common sense assures us that a custom directly opposed to this protective mode of covering the chest must be productive of the most fatal consequences.

The surfaces of skin over the chest, leading directly to the lungs, are the most vital portions of the organism; and to expose them, and thus check the important processes of evaporation, is a sacrifice to fashion which cannot be too severely censured. I once had occasion to remonstrate with a young mother on the imprudence of exposing the tender surfaces of her little one's neck and arms to the air when "full dressed," and carefully excluding it from the mouth and face by veils and shawls

when taken out into the atmosphere. She answered me, "it looked so pretty," and "its neck and arms were so like wax it was a shame to hide them,—but as to the open air blowing *into* its lungs when out of doors—oh, of course, that must be dangerous," etc. When that young mother laid away her little girl in the grave, robbed of life by the action of a severe cold falling upon the lungs, she could not be made to comprehend that she had herself been instrumental in its premature decease, that the air which she had so unwisely restrained from entering in by legitimate channels to the throat and lungs had been absolutely necessary to vitalize its fading life, that the lungs had been poisoned and become shriveled for the want of it, and that the muffling veils and shawls that had driven it back were so many fragments of its shroud. This is the action which, measurably, every fashionable female induces when she goes out muffled up to the eyes to keep away the healthful air from the interior of her lungs, and returns to the heated ball-room or fashionable assembly with neck and shoulders stripped bare, and alternate waves of heat and streams of cold striking upon her with deadly though insidious force. The face, throat, hands, and even feet, may be bared with impunity, but the surfaces which cover deep muscles or vital organs should never be exposed to the direct action of the air; and it is from the wanton neglect of this important item in hygienic practice that so many females fall victimsto consumption, bronchial affections, and lung-diseases.

Another dangerous violation of hygienic law is the use of elastic bands around the arms or knees for

the purpose of confining under-sleeves or stockings. The rubber fabrics used for this purpose not only compress the limbs injuriously, but seriously affect the circulation and render the wearers liable to paralytic and other retarded conditions of the circulatory flow, the full extent and danger of which seem to bear but slight proportion to the insignificance of the producing cause. When it is remembered that straps attached to the stockings and fastened to a band worn about the waist will answer all the purposes of neatness without any of the dangers or inconveniences of elastic compressions at the knees, the maintenance of this practice by well-informed persons seems almost inexcusable.

Still another pernicious custom imposed by fashion, is the use of tight compressions round the waist, so common in the costume of fashionable females. To insist that the skirts shall be cut short, and the garments worn loosely dependent from the shoulders alone, is neither necessary nor philosophical. A moderate amount of support given to the ribs at that portion of the female organism called "the waist," is not in the least degree injurious; on the contrary, by confining, without undue pressure, such garments as depend from the neck and shoulders about the body, the weight is more equally divided, and both thorax and abdominal regions are better protected than by simply hanging clothes around the form; but the source of all injury in this direction is first the unnatural and closely-drawn compression of the waist, to the manifest injury of the respiratory and digestive organs, and next the custom of imposing upon the hips and body the excessive weight of a great number of heavy skirts.

No matter what fashion dictates, the compression of the ribs, in order to produce the effect of a *small waist*, is fatal either to lungs or stomach, or both. The simple view of the organism in its natural state will bear sufficient testimony to the injurious effect of compressing the waist. The lungs are squeezed together, the action of the heart must be labored, the diaphragm cannot move freely, and the stomach, with all its attendant viscera, is forced out of place. Does it require any treatise to predicate the results of such an insane and pernicious custom? So long as it prevails, look to see our young women pale, emaciated, and consumptive; our mature women dyspeptic and victimized by all sorts of internal difficulties; and the rising generation afflicted with a set of hereditary diseases entailed upon them by the pernicious influences of unphysiological customs in dress.

The same remarks apply to loading the head—especially the back brain—with masses of false hair. Besides the injurious weight imposed upon a part of the body which should be kept as free as possible from all extraneous matters, the heat thereby produced is fatal to the integrity of the organism; the scalp, too, becomes clogged, the evaporating processes hindered. Cleanliness is wholly incompatible with such a custom, and it is nine chances to one but diseases of the brain will ensue from its long continuance.

No word need be written against the use of cosmetics. Anything which chokes up the pores of the skin *must* be injurious; hence all pleas urged for the "harmless" nature of the cosmetic employed are at once quenched, and every application made to the

skin, except pure water and soap, must be included in the category of unphysiological offenses.

I must here add a few words on the preservation of the teeth. We have already suggested that dyspepsia is one of the most fruitful sources of injury to the teeth, and the unphysiological methods of diet practiced among us are quite enough to account for their early decay. We must remark, however, that in Europe, where persons, even of advanced age, often present the pleasing spectacle of a fine set of teeth, it is an invariable custom among well-bred people to charge upon their children the use of the tooth-brush night and morning. Besides the charm which clean teeth present to the eye, besides the improvement it must impart to the breath and digestive apparatus, there can be no doubt but that the act of removing the animal matter which adheres to the sockets of the teeth must be instrumental in preserving their integrity and keeping them sound and white. Americans are not sufficiently careful in this respect, and many a young girl, whose countenance would otherwise be beautiful, is only tolerable when her mouth is shut, and a set of yellow, unclean teeth are hidden from view.

I have only to add that thick-soled boots, without being too weighty, are far more conducive to health than thin. Woolen socks or stockings are better calculated to preserve the feet from chafing than cotton; but silk, as being non-conductors of electricity, should be only worn when mixed with cotton, in the fabric commonly called spun-silk. Fine thread, however, is a far better article for wear on the feet than silk at all.

Veils, though agreeable to *shade* the face, should never be pressed over the mouth so as to repel or drive the breath back upon the breather.

Such simple directions as these, small and unimportant as they seem to the more momentous issues of life and death, are all and each sand-grains, essential in the structure of life and instrumental in promoting or retarding the approach of death. Let no one despise the day of small things, for of such are the grand totalities of being made up.

Part VI.—Late Hours.

I cannot sufficiently deprecate the custom of turning night into day, or remaining longer in bed than the absolute demand for rest and recuperation of body requires. There can be no doubt but that nature designed man to conform to the habits of the lower creatures in respect to employing the hours of darkness for rest, and of light for activity. It may be argued against this position, that the seasons of winter and summer are so unequal that it would be impossible to conform to this rule without an entire change in all our social systems; but this argument might be at once met with the question, why we ever organized social systems that were not in harmony with nature?

Not to enter upon useless and speculative theories, however, and taking society as it is, not as it should be, we find that the conditions of darkness are unfavorable to growth, activity, or any great tax upon the system, mentally or physically. Light is the result of a galvanic action going on between the terrestrial and

solar atmospheres. Darkness is the suspension of that action.

No kind of artificial light, however brilliant, can affect the atmosphere generally, or replace the healthful vitalizing activity of the sun's influence; hence, we repeat, the condition of darkness is unfavorable for human action, and the more we can shorten the period during which we employ it the better. Let the extreme languor and lassitude which palsy the frames of those who rise after any efforts prolonged into the night hours, bear witness of my position.

The custom of remaining in bed whilst the busy particles of the atmosphere are circling beneath the influence of light, is equally unnatural and injurious. Besides enervating the frame by the heat of the bed, whatever habit is opposed to natural law must be more or less injurious. The activity of nature manifest in the very fact of light, and its origin in motion, implies that it is the season most favorable for human effort, and therefore the sooner we can leave our bed, and bathe ourselves in the morning light after it has dawned, the more naturally we shall live and the more healthfully we shall maintain life.

Did the limitations of our space permit, we should have much to say about the employments of life, and the necessity of alternating amusement with business, practicing social virtues, social habits, and recreative enjoyments. We should urge upon all persons the culture of plants, both as a healthful act and a beautiful source of psychological enjoyment. We should advocate the practice of music whenever attainable, as an element in social life, impressive for good, and

therefore for health; but all these subjects, although comprehended in the laws of social science, belong rather to the relations of mind with matter than of matter with mind. That a contented mind, an even temper, and a spirit disciplined into the subjugation of every passion to the rule of reason, are all essential features of healthful existence, every day's experience demonstrates to every rational creature.

That a large percentage of our physical evils are the results of ill-balanced minds, violent tempers, and mental sufferings, are axiomatic facts which none can deny. The specialties of this treatise, however, do not permit us to enlarge upon these most important themes beyond a mere hint as to their influence. The best, and indeed sole conclusion to which we can at present arrive is, that TEMPERANCE in all things, whether physical, dietetic, emotional, passional, intellectual, or spiritual, is the golden mean of a true life; that its neglect is crime, disease, and misery; its observance, health, wisdom, and happiness.

CHAPTER XI.

MEDICAL PRACTICE.

ITS ANTIQUITY AND PROGRESS.

FROM the earliest ages it has been found that in proportion to the increase in man's artificial demands, so has his physical system retrograded from the condition of rude health to one of disease and degeneration. Whilst the mind grows and expands under the influences of civilization, the body becomes obviously disturbed, so that some ancient philosophers have not hesitated to affirm that it was the unnatural tension that education imposed upon the brain that changed the normal condition of health, so invariably found in the savage, to those complicated states of disease which ever prevail in connection with civilization. To this sweeping proposition, however, I do not believe our sage ancestors will find many adherents. That an undue amount of mental labor must at all times prove prejudicial to the physical system is an axiom which it requires no special degree of philosophy to comprehend, but that the normal exercise of the brain, and the direction of the faculties to the acquisition of knowledge, can ever operate unfavorably upon the body, no rational observer of human life and its functions can believe.

Other causes must be sought for, then, to account for the degradation of the physical system which ensues in the change from savage naturalism to civilized artificialities, and these are easily enough discovered when we begin to analyze the unhealthful methods of living which the conventionalities of society impose upon us.

Crowded cities, filthy streets, undrained waste places, ill-ventilated dwellings; the unnatural habit of turning night into day, and spending long hours which ought to be devoted to rest and recuperation in heated, over-crowded places of amusement, where the exhalations of a heterogeneous assembly combine with the effluvia of gas to poison the air; the over-exercise to which the poor are condemned, the excessive indolence which debilitates the bodies of the rich; bad and unwholesome food taken in too little or too much quantity; the varieties of stimulating drinks, spices, and condiments introduced by modern luxury; the absurd compressions and exposures which fashion dictates in costume; all these, and hundreds of other pernicious customs originating in what is called civilized life, are more than sufficient to account for the gradual degeneracy which possesses the physical systems of those who live under its institutions.

Without attempting to discuss the means by which the abuses of civilization might be separated from its splendid uses, it is enough that we simply allude to their existence by way of introducing that system of remedial art which has been deemed necessary to counteract their evil effects, namely, the practice of medicine.

In all savage nations, health is found to be the normal condition of life; nevertheless, as there are

always a set of accidents liable to result from contact with wild beasts, noxious reptiles, and intestine wars, so we generally find the "medicine-man," or healer, an appendage even to the rudest forms of aboriginal man's associations. In the lowest conditions of savage life, the attempts to repair the wrongs inflicted on the body by accident or violence are, for the most part, superstitious rites of the fetish character; and where these fail, the victim is left to perish, or offered up as a propitiatory sacrifice to some hideous fetish deity; but among the more intelligent tribes of wild men, such, for instance, as the North American Indians, a regular system of healing by herbs and medicinal plants is practiced with good effect.

Disease *per se*, we again repeat, is unknown among savage tribes, except as derived from contagious contact with civilized men.

Even the ordinary processes of parturition are attended with so little pain or inconvenience that no medical skill, and scarcely any cessation from the daily duties of daily life, is demanded. The wild woman, living purely under simple and natural influences, brings forth her child one hour, and rejoins her companions, partaking of their meals and sharing their labors, the next.

Thus it is that the simple surgery which the medicine-man of the tribe applies, in the form of herbs and roots, for the cure of wounds, bruises, bites, stings, etc., bears no resemblance whatever to the complex and elaborate methods by which the scientific physician is called upon to treat the various forms of disease unknown in natural conditions of life. It is to the

history of civilization, therefore, that we must look to trace the history of medicine. There is no doubt but that we should find the first records of medical skill existing cotemporaneously with the first record of a demand for its exercise; but, not being in possession of any vestiges of this very primitive state of society, we must content ourselves with noting the character of the remedial arts practiced by the historical ancients.

Among the Hindoos, Egyptians, Arabians, and Eastern nations generally, therapeutic art consisted of a mixture of animal magnetism, accompanied by superstitious rites, such as prayers, ceremonials, the consecration and wearing of amulets, charms, and sacred objects. Ablutions and purifications were abundantly, and, of course, beneficially, practiced in these methods. Herbs, roots, and waters of known medicinal quality were also parts of the ancient pharmacopœia; but, above all, the temple, sleep procured by aid of the priests, and assisted by narcotics and the influence of soothing music, were means of restoration abundantly sought for by those who were able to pay for them. There are constant evidences in ancient history to prove that magnetism as evolved from the loadstone, minerals, metals, and crystals, no less than from the healthful manipulations of the priests, formed a large part of Eastern therapeutics; but, as we have before dilated on these subjects in earlier chapters, it would be needless to dwell upon them now.

The first clearly-defined account we have of regular medical practice among the Egyptians is supplied by Herodotus, who writes that there were physicians besides the priests, and that these devoted themselves to

the cure of special ailments and organs; so that there were professors of the healing art who dealt only with diseases of the eye; others who administered to the stomach, and whose system consisted mainly of purging and emetics. Some mediciners treated solely the teeth, others the head, and others, "mysterious complaints, which had no visible source."

The Greeks soon outstripped their Egyptian teachers in the practice of medicine, and it is from them that we derive the most prolific accounts of the state of medical science in the periods of antiquity.

The practice of medicine in these remote periods is chiefly traceable through the renowned personages with whose names it is associated. One of the earliest and most famous mediciners in classical lore was Æsculapius, so often mentioned as the god of medicine, and even mistaken by the unlearned for a mythical personage altogether.

Notwithstanding the fact, however, that classical writers assign to this celebrated individual a deific origin, representing him as the son of Apollo, with a history full of miraculous events, the real Æsculapius was a mere mortal, with human parents and a human posterity,—that is, if we can credit the testimony of Homer and Pindar, both of whom make mention of Machaon and Podalirus, sons of Æsculapius, who fought in the Trojan war, and, like their father, acted the part of healers to the sick and wounded.

The practice of Æsculapius and his sons was only in accordance with the knowledge of the times, and consisted of a strange mixture of psychologic, magnetic, and therapeutic remedies, commingling prayers and incan-

tations with drugs, herbs, and draughts in which pearls, corals, and precious stones had been ground up; also an important part of their system was gymnastic exercises. That Æsculapius was considered more than ordinarily inspired is proved by the fact that after his death he was deified as a god, and numerous temples were erected in his honor, the most famous of which, at Epidaurus and Rhodes, became renowned for the curative marvels performed by the priests, supposed to be instructed in the mysteries of healing by the direct presence and communion of "the god."

The practice of medicine as a science seems to have made but little progress until the time of Hippocrates, a learned Greek physician who flourished 460 years B. C., and whose attainments in his art were so far in advance of all his predecessors that he has justly been styled "The Father of Medicine."

The knowledge which Hippocrates acquired of the human system, and his treatment of disease, were truly marvelous, considering the age in which he lived. Dissections of the dead at that time would have been considered the last, worst crime of which mortals could be guilty; yet this learned man had acquired such a fair knowledge of the human frame that his treatises are far in advance of his age. He describes many of the bones correctly, and gives valuable accounts of the arteries, trachea, chest, the nature of inflammation, fevers, and the leading symptoms of different diseases. In his methods of treatment, Hippocrates seems to have been the first physician of antiquity who insisted on the value of appropriate diet and the necessity of attending to the temperature

of the sick-chamber. Although his remedies are the corner-stones of the "heroic school" of practice, such as violent purgatives, bleedings, scarifications, cuppings, etc., his whole system is such an improvement upon the superstitious arts of priestly therapeutics that next to Æsculapius—of whom he and his ancestors were, for many generations, devout followers—Hippocrates may truly be regarded as the best of all the ancient mediciners.

The next important era in the progress of medical art dates from the beginning of the second century, about which time there appeared two of the greatest lights that had shone on this department of science since the days of Hippocrates. These were Aretæus, the Cappadocian, and Galen of Pergamus. Aretæus, the senior of these great Therapeuts, seems to have been rather the founder of a new school than the follower of any predecessor. His writings are largely intermixed with opinions concerning the deep influence which the *pneuma*, or soul, exercises on the body. He assumed the heart to be the central seat of soul, whilst the liver he designated as the centre of the blood-currents. He describes correctly the functions of the spleen, stomach, and colon; paid much attention to the kidneys; accurately defines the nature of glandular bodies and secretions; and, remembering that the superstitious reverence paid by the Greeks to the dead, prevented all chance of attaining anatomical knowledge through any other channels than observation, his scientific perceptions of the human structure, like those of Hippocrates, were truly wonderful.

Aretæus was the first physician who distinctly stated

that sensation and motion resided in the nerves. Moreover, he showed that nerve-fibres in the brain crossed each other, decussating, as he described it, like the Greek letter *X*, whilst the fibres of the spinal cord, he taught, proceeded at once to the particular organs they supplied. He assumed that all the white tissues of the body were nerves, and thus he failed to recognize the true character of tendons and ligaments. Although he still adhered to the heroic practice of his predecessors, Aretæus urges upon physicians the necessity of taking hints from nature, and modifying systems to suit particular temperaments.

In Galen, the true and noble founder of the eclectic school, the world found at once a philosopher and a physician. Although a profound student of all the then known systems of medicine, Galen adhered rigidly to none, but contented himself with appropriating the best of each and adding thereto such new ideas as he derived from deep study and extensive experience. His knowledge of anatomy was obtained in part from dissections of apes and other animals, but he also enjoyed some opportunities of examining the human system, since he describes his delight at finding the body of an unburied criminal, and a skeleton which he could possess himself of at Alexandria. His definitions of muscular action were wonderfully correct. He made many discoveries, too, on the passage of the blood through the veins, and taught that the opinions of old anatomists were at fault when they assumed that "animal spirits," rather than functional motions, propelled the fluids of the body. Galen made many valuable physiological discoveries, and though there

existed rumors that his operations on his patients, in surgical cases, were frequently conducted for the sake of experiment rather than cure, the world profited by his daring; and medical, as well as surgical science, received an impetus from this great man for which his name deserves to be immortalized. It would be useless now to analyze the theories of Galen, advanced, as they were, beyond all his predecessors, for, whilst his ideas concerning the different functions of motor and sensory nerves were correct, his descriptions of the cranial nerves were confused and imperfect, and his ideas about the vital and animal functions partake of the transcendentalism of his time, referring all unknown movements to elemental and spiritual causes. His lectures on anatomy, at Rome, produced such a furore that the jealousy of the Roman practitioners eventually compelled him to quit that city.

His written treatises were most voluminous, and for centuries after his death were accepted as authority, even by scientists far in advance of himself.

From the days of Galen to the tenth century the Greeks continued to maintain their influence over the civilized world in the department of medical science. After that era, the Arabian physicians took the lead in general estimation, and many of them, especially those who devoted themselves to the study of alchemy, acquired wide renown for their scientific knowledge and practices.

The speciality of the Arabian school might justly be termed chemistry. Their researches into the chemical properties of drugs and minerals were carried forward into the human organism and the vital changes which

there transpire. They introduced many new and valuable remedies; discovered many important functional changes in the body; and enlarged the circle of medical knowledge in every direction.

The history of the Arabian school of medicine and chemistry is so frequently obscured by the dreams of the alchemists and the mystery which was thrown around their researches for the "philosopher's stone," that the world is scarcely aware how much medical science really owes to the discoveries of Arabian sages. From the twelfth century, the Italian and Spanish mediciners to a great extent superseded the Orientals, and the fact that the dissection of the human body was first publicly allowed and practiced at Bologna, in the beginning of the fourteenth century, tended to give the Italian school a pre-eminence above all others.

The first well-recognized medical school that flourished in Europe was founded in the seventh century, at Salerno. Many others soon followed, and the study of medicine acquired such a rapid popularity that fine schools of medicine were attached to many of the European universities. In the fourteenth century there were collegiate institutions of this character at Montpellier, Vienna, Bologna, Paris, Rome, Padua, Pavia, and many other seats of learning throughout Europe.

Up to the time when the physician's art became secularized and recognized as a special branch of study by the foundation of these schools, the care of attending the sick had chiefly devolved upon the clergy. In Greece, Rome, and Oriental lands, the offices of priest and physician were often, but not invariably, united; but in Europe, during the first few

centuries, medical art and its practices were confined almost entirely to monks and ecclesiastics. As these sacred orders, however, were forbidden to interfere with any operations that involved the shedding of blood, a separate branch of the art was formed, including cupping, bleeding, the setting of bones, reduction of fractures, etc.; and these practices, when not of a very dangerous or elaborate character, were commonly intrusted to the barbers, who, by their familiarity with the lancet and cupping-glass, acquired a considerable share of skill and repute.

It was from the distinctions growing out of *sacred* and *secular* practice that the offices of the surgeon and physician became separated. A third class was formed also by the apothecary, or compounder of drugs, and this speciality took rise from the Arabians, who were often known as skillful chemists and good druggists, yet they did not always possess the requisite knowledge to become physicians to the sick, or perform surgical operations. Thus, then, the offices of physician, surgeon, and apothecary became distinct from each other, and this custom, originating in the specialities of primitive conditions, has continued in force unto the present day.

It is not accurately known when the title of Doctor of Physic was first used. We find it commonly applied to physicians in the fourteenth century, and degrees at that time were regularly conferred. It was in 1422 that the English universities obtained a decree from government that "no one should use the mystery of physic who had not studied it in an university, and taken at least a bachelor's degree, under a penalty of

forty pounds." The same fine was inflicted on any woman attempting to practice the "mystery of physic."

From the twelfth to the seventeenth centuries, a set of men arose who were vaguely known as alchemists, rosicrucians, mystics, etc. These persons, who were often skillful chemists and profound students, unfortunately served to retard the practice of medicine as a science by mixing it up with their own transcendental claims to have discovered, in the occult realms of nature, profound secrets, the application of which would far exceed in results all the routine practices of the schools. Among these men were many famed for their chemical discoveries and spiritualistic writings.

Such was Cornelius Agrippa, the famous magician, in reality a skillful physician and an expert chemist. Thomas Aquinas and Albertus Magnus were of the same school, and the wonders of magic attributed to them were obviously results obtained by their chemical knowledge. The most famed of these middle-age wonder-workers, however, was Paracelsus, a native of Berne, who was born in 1493, and practiced his art as a regular physician for many years at Zurich. There can be no doubt but that Paracelsus, during the progress of his alchemical pursuits, to which he was passionately devoted, succeeded in making some valuable discoveries concerning the virtues of stones, crystals, and metals. That he already perceived those indications which in subsequent generations led to the construction of galvanic batteries and electrical machines, is evident to any one who will take the trouble to peruse his voluminous writings, and endeavor to disentangle—amidst the mass of verbiage in which his

ideas are obscured—his imaginings concerning his favorite pursuit of alchemy from his really valuable observations on the galvanic forces existing in the mineral world, and their susceptibility to evolution in certain skillful combinations. Paracelsus, despite his incomprehensible claims to occult science, was unquestionably an accomplished chemist, and in the progress of his researches hit upon many valuable indications of the hidden forces of galvanism and electricity.

His bold assumptions and certain successes he achieved in the healing art, procured for his system of practice many followers, who for two centuries after his death continued to have faith in him as the founder of a "new school." In the year 1526, Paracelsus was elected Professor of Physics and Natural Philosophy at the University of Basle, and here he became so popular by his eloquent lectures and voluminous writings that his system bid fair to supersede all others then known in Europe. By way of showing his contempt for older authorities, the great mystic publicly burned the writings of Galen and Avicenna. In violent terms he denounced all other practitioners than himself, and all other arts than his own, affirming "that there was more knowledge in his shoe-strings than in all the practitioners' heads of all the European universities."

It was Paracelsus that brought into repute the use of mercury and opium, two drugs which had hitherto been regarded with fear and used with extreme caution, but which under his advice were largely administered in various conditions of disease.

Unfortunately the man that mixed up astrology and medicine, the influence of "legions of spirits" with

blue pill and the elixir vitæ, however he might in his own person succeed in temporarily impressing his admirers, could not fail in time to lose his hold upon the really scientific and judgematical; hence it is that we find his career as an acknowledged leader of art soon sinking into obscurity, and his only following confined to the weak and imaginative, and especially to such as still clung to the dreams of alchemy.

It is true that Paracelsus gave some check to the fossilization of old and conservative ideas in medical practice. Still he bequeathed to mankind nothing more really valuable than suggestions of the intimate though mysterious relations subsisting between the worlds of visible and invisible existences. In later years, "mystics" of a still more exalted character and less arrogant pretensions than Paracelsus assumed to cure diseases by occult means, and the aid of invisible forces and powers. Probably the succession of these persons would have increased and continued to the present day, had not the really scientific acumen of Mesmer resolved the problem of the "philosopher's stone," by the discovery of mineral and animal magnetism.

To return, however, to my review of the actual progress of medical science in the direction of material facts.

Perhaps the most important era that ever dawned upon medical art was the end of the sixteenth century, when a bold and learned anatomist named Vesalius arose, who, despite the obloquy that still attached to the study of the human structure from dead matter, pursued his researches in the dissecting-room so thoroughly that many of the most important functions of

the human body were brought to light, and a rapid impetus was communicated to the progress of anatomical knowledge. The most stupendous discovery of this kind, however, that the period chronicles, was that of William Harvey, of England, the celebrated physiologist, who first arrived at the conclusion of the circulation of the blood.

Harvey was born in the year 1578, and having been carefully educated in a fine school of medicine at Padua, and acquired an excellent reputation for his skill as an anatomist and lecturer in his own country, he was elected a Fellow of the Royal College of Physicians, and received the honorable appointment of chief physician to Bartholomew's Hospital in London.

It was in a lecture on anatomy given before the Hospital Faculty, in 1615, that Harvey brought for the first time to public notice his famous theory of the circulation of the blood, and the functions of the heart as the centre of the circulatory system.

According to the highest authorities of the day, the opinions of anatomists before Harvey's time were these. It was assumed that the blood was distributed to various parts of the body by the veins, whilst the arteries were only the passages for "vital spirits" formed of the air and blood transmitted from the lungs to the left side of the heart. How the blood passed from one side of the heart to the other, got into the lungs, or became propelled through the veins, were points of opinion disputed with great vehemence by the advocates of conflicting theories. Harvey seems to have favored none of the views of the popular theorists, borrowed from none, disputed with none.

His opinions were derived solely from his own carefully-conducted observations and dissections.

Experiments also on living animals were then, as now, a means of informing the scientist of the motions transpiring in vital organs, and from all these sources Harvey evolved his famous theory of fluidic circulation. In conversing with Boyle, a celebrated medical writer of the day, Harvey is reported to have said that his belief in his circulatory theory was first suggested to his mind by speculating upon the uses of the valves of the heart. The more he considered their nature and functions, the more apparent it seemed that they were designed to permit the passage of the blood one way, but to impede its return by the same channel. Harvey explains, with all the candor of true science, the methods of observation by which he arrived at his conclusions, and the various premises on which they were founded. His researches were conducted on both warm- and cold-blooded living animals, besides which, this careful student drew deductions from dead matter, speculating on the obvious uses for which certain parts and organs seemed to be designed. He compared these with living structures, found them to agree, and hence evolved a theory whose completeness is now acknowledged by every true scientist to be little short of a revelation.

Notwithstanding the immense value of Harvey's great discovery, and the frank and irresistible proofs with which he sustained his positions, the bigotry of old conservative modes of thought, and the pitiful jealousy which ever seems to arise in the minds of rival practitioners, combined to crush the great scientist, and

cloud his theories with distrustful whispers and contemptuous denials. Superstition, too, lent her baleful aid to darken the path of knowledge which the profound physician had opened up. Old friends forsook him his; practice fell off; a popular impression prevailed among the vulgar that he had purchased unlawful secrets from evil sources, and among the better educated it was currently reported that he had tortured his patients, and resorted to the most unscrupulous practices to arrive at the hidden mysteries of the life-processes so strangely revealed by him. It was difficult, too, to shake the long-cherished opinions which had been traditionally held as correct by the medical faculty, and Harvey himself declares, in his writings, that after the publication of his famous treatise on the circulation of the blood "there was not a practitioner of more than forty years old who credited him." For some time Harvey felt too much disgusted with the ignorance and ingratitude of the race he sought to benefit to communicate more of his valuable discoveries to the world; but the afflatus of true genius was upon him. He *must* think, write, and publish, as a part of the usury required for the possession of every great talent. The irresistible pressure of *ideas* compelled still further efforts and still more sacrifices.

He gave to the age his remarkable treatises on generation, illustrated by the embryonic life and development of certain animals, and again the theorist who dared to advance one step out of the beaten tracks of thought became the subject of vituperative attack and unworthy criticism.

William Harvey acted in the capacity of physician-

in-ordinary to James the First and Charles the First of England, and when the dethronement and death of his last royal master threw him out of office, his house was plundered and many of his valuable writings sacrificed in flames to the intolerant zeal of political factions.

Retiring at last to a peaceful retreat in the country, the fine old scientist closed his long and useful life at the age of eighty years, leaving behind him an immense collection of published works, and ONE IDEA, at least, which in point of physiological importance surrounds his name with a halo of well-earned and undying fame.

The history of medical science in the eighteenth century presents us with such an illustrious record of great names and personages whose services to the scientific world demand honorable remembrance, that we are obliged to select, from the many, two or three representatives only. We shall speak, then, of three in particular to whom the progress of medical science is largely indebted, and whose labors made a special mark upon the age.

The first of this celebrated trio is Albert von Haller, a physician, born at Berne, in Switzerland, in the beginning of the eighteenth century. The speciality of this great man's industrious researches was physiological discoveries concerning muscular contractility and nervous irritability.

Besides his medical skill, Haller was a man of the most profoundly scientific attainments, and had mastered many branches of natural philosophy. To him the subject of vital phenomena and the problems

connected with the mysterious functions of life were themes of all-absorbing interest. He brought to bear on these questions all the knowledge of the natural sciences which he had gathered up in other studies, and though we cannot now, perhaps, point to any work of Haller's which is accepted as a medical text-book, his influence in disabusing the age of many popular errors, and explaining multitudes of the mysteries which had heretofore obscured the study of anatomy and physiology, conferred upon all time a lasting benefit, and aided, far beyond our limited chances of acknowledgment, the better understanding of medical science, especially in the department of physiological knowledge.

The two next and last worthies of this period of whom our space will permit us to speak in this chapter were the brothers William and John Hunter, names dear to every lover of science, and honored in every society where the beneficent uses of medical skill are fairly appreciated. These men were both natives of Scotland, and born in the early part of the eighteenth century. William, the elder, was first educated for the church, but turning his attention to medicine, and being found by his instructors endowed with remarkable talents in this direction, he was permitted to follow the bent of his inclinations and pursue the medical profession. In the course of his collegiate career, he formed a life-long friendship for the celebrated William Cullen, who was established as surgeon and apothecary at the University of Edinburgh, where Hunter was a student. On the completion of his studies, Hunter was taken into partnership with Cullen, and the two,

each in their different branches of practice, attained to the highest celebrity of their time. Hunter selected for his specialty the department of midwifery, and as a discoverer, writer, and practitioner in obstetrics, it is said that no man ever equaled or has since exceeded him. Honors were showered thickly upon him, and a large fortune accrued from the wonderful successes of his practice. His works are still text-books on the subject of obstetrics, the value of which have not diminished by age.

John Hunter, the younger brother, commenced his career in the humble capacity of assistant to Dr. William in the dissecting-room. Pursuing his studies with indefatigable diligence and research at many of the London hospitals, and subsequently going abroad to serve as an army surgeon, he ultimately became no less famous than his elder brother, although in a different department of medical practice.

After his return to England, John Hunter was elected a Fellow of the Royal Society, and subsequently became surgeon to St. George's Hospital. In the zenith of his reputation the most distinguished scholars resorted to him for opinions, and his pupils were numbered among the most aristocratic families in the land. The celebrated Edward Jenner and Sir Everhard Home studied with John Hunter, and the sister of the baronet subsequently became the great surgeon's wife.

Although Mr. Hunter achieved an immortal reputation as a practitioner and the author of many valuable works on anatomy, surgery, etc., his chief benefaction to the world at his death was a superb anatomical museum, containing upwards of ten thousand prepara-

tions, illustrative of medical science and natural history.

It would require far more space than we can allot even to enumerate the treasures of art bequeathed to the world by the two Hunters. It had been the aim of Dr. William to found a national anatomical museum, and besides tendering to the government his splendid collection of models, preparations, etc., he had offered to contribute seven thousand pounds sterling in money. The parsimony of those in office would not allow them even to grant the noble old man a piece of land on which to build his proposed museum. He purchased a place for himself, therefore, built a museum and dissecting-room at his own expense, and furnished it with the rarest specimens of art that the age could show. Thirty years after his death this grand repository of treasures was removed by the terms of his will to the University of Glasgow, where it remains the gift of a private individual to a nation not magnanimous enough to acquire it at its own expense. John Hunter's museum, which is, in itself, a gigantic monument of talent and industry, was sold, at his death, to defray the enormous expenses of its collection, and in aid of his family's support. It was purchased by the Royal College of Surgeons, London, at an outlay of fifteen thousand pounds, and in this establishment it remains a wonderful testimony of the power of one individual to contribute stores of useful knowledge enough to bless and enlighten many generations of men.

NOTE TO CHAPTER IX.

It will be remembered that we have pointed in this chapter to the distinctions drawn by the force of circumstances between the three

classes of medical practice, entitled, Physician, Surgeon, and Apothecary. In England, and indeed throughout Europe generally, the title of "doctor" only accompanies the physician's degree, and surgeons and apothecaries (unless they have taken that degree) are only called "doctor" by courtesy. The reader will remark that the title of "doctor" was not given in the text even to the renowned surgeon, Mr. John Hunter, nor would any truly scientific practitioner in Europe deem himself honored by the acquisition of any title which did not legitimately apply to him. These points of professional etiquette are commended to the notice of the American medical faculty, especially to those whose "doctors' degrees" are so often self-imposed, and not unfrequently upon the ground of selling quack nostrums or peddling about patent pills.

CHAPTER XII.

THE STATUS OF MEDICAL PRACTICE FROM 1750 TO 1873.

THERE are many noble names necessarily omitted in our former chapter on the medical profession, from the total impossibility of crowding up a work of this limited character with any records but those which are essential to the unfoldment of the principles on which it is written. As this and the last chapter is all the space that we can allot to such a record, we must content ourselves with adding but a few more sketches of eminent medical practitioners to the list already given. Having mentioned the name of Dr. Edward Jenner as a pupil of Mr. John Hunter, it may not be out of place to offer some remarks on the peculiar nature of the discovery with which his reputation is always associated, namely, the practice of vaccination.

Dr. Jenner was born in Gloucestershire, England, in the year 1749, and, after studying surgery with Mr. John Hunter, took his degree as a physician at St. Andrew's University.

Dr. Jenner's specialty being so marked, however, as the author of the vaccination practice, we may confine our attention to the circumstances in which his great discovery originated.

It is said that whilst Dr. Jenner was practicing at a village called Sudbury, he heard a country-woman

observe that she could not take the smallpox, as she had already received it from a cow which she had been milking. Struck with the singularity of this remark, the physician pursued his inquiries among the people of that district, and found that the opinion prevailed universally, that whenever any one imbibed a certain form of irruptive disease to which cows are subject, they would thereafter be free from all liability to suffer with smallpox. Following up the ideas thus curiously received, Dr. Jenner pursued a long and patient course of experiments, the results of which were conclusive to his mind that one particular kind of irruptive disease to which cows are subject could be communicated to the human body, and that its action would thereafter, as he deemed, prevent the liability to smallpox. It is quite needless in this place to contend for or against the value of Dr. Jenner's discovery, nor yet to argue on the successes or failures of its practice. It is enough that it has been more widely received and stringently enforced than any other medical theory that the annals of history record.

If the plague entitled the smallpox had indeed been effectually subdued by vaccination, and again, if it were an ascertained fact that no other forms of disease had been engrafted on the human structure by the act of vaccination, Dr. Jenner's name might well stand foremost in the list of earth's benefactors; but as opinions are by no means unanimous on these most important points, it is enough that we leave to time—the touch-stone of truth—the final decision of the question, and simply advert to Dr. Jenner as the author of a system which maintains such a deep and wide-

spread hold upon the customs of civilization to this day. The high estimation in which Dr. Jenner's discovery was held by government is testified to by the fact, that grants of ten, and subsequently of twenty, thousand pounds were voted to him in Parliament, and that his name is cited by a large majority of the civilized world as one of the greatest benefactors to the human race that ever lived. If contrary and very antagonistic opinions on the value of his discovery are now becoming widely prevalent, Jenner himself did not live to realize them, as he died in 1823, in the full tide of a world-wide popularity.

The path of discovery in science is not always that of progress, nor are the progressionists of life invariably the outworkers of new ideas. Hahnemann, Mesmer, Gall, Spurzheim, Galvani, Volta, Franklin, and many others, too illustrious to be forgotten, but too numerous to mention, all stand forward in bold relief in the history of ideas as original discoverers. In this category Jenner himself may take his place with propriety, but in the mean time the gradual and beneficent unfoldments of practical science in medicine owe quite as much to the talented men who utilize and apply ideas, as to those who first discover them. Among these practical benefactors to the race we may class the venerable Abernethy, Sir Astley Cooper, the celebrated brothers Charles and John Bell, Bransby Cooper, Sir Benjamin Brodie, Liston, and hosts of others scarcely less distinguished.

None of these eminent gentlemen can be termed discoverers in the strict sense of the term,—that is, they invented no new system, made no startling revelation

of new truths in their several departments of science,—yet each of them wrought marvels for the advancement of their art, and left the world so much better than they found it, that they are well entitled to the highest place in human appreciation. Sir Astley Cooper in especial, retains his hold upon the grateful remembrance of his age.

His works, entitled "Medical Records and Researches," his great treatise on "Hernia," his bold, original, and magnificent new operations, the many instances in which his excellent treatments superseded the use of the knife, and the invariable kindness, courtesy, and humanity of his beneficent nature, endeared him to all his cotemporaries, and procured him honors and distinctions almost unparalleled in his profession. It is said that at one time his income, derived from his immense reputation as the most original and yet successful surgeon that ever lived, exceeded twenty-one thousand pounds per annum.

George the Fourth employed him to perform a difficult and dangerous operation, which having been attended with his usual success, caused the monarch to confer upon him the unprecedented and distinguished title of a baronetcy, a dignity now enjoyed by his nephew and heir, Sir Astley Cooper the younger. Many literary works of the highest excellence were given to the world by Sir Astley Cooper, but the specialty of his life was his own splendid success as a surgeon.

Dr. Forbes, an eminent medical writer, says of Cooper: "Before his time operations were too often frightful alternatives or hazardous compromises, and they were not seldom considered rather as the resource

of despair than as a means of remedy. He always made them follow, as it were, in a natural course of treatment: he gave them a scientific character, divesting them of their terrors by performing them unostentatiously, simply, confidently, and cheerfully, thereby inspiring the patient with hope of relief where previously resignation had been all that the sufferer could command."

Of all the modern celebrities whose name is most frequently cited to point an anecdote or illustrate a quaint saying, none is more frequently in men's mouths than the eccentric Abernethy.

This distinguished surgeon was a pupil of John Hunter's, and flourished at the same epoch with his great teacher. His qualities as a successful operator, fine surgeon, and profound writer are unquestionable. He is also said to have been remarkable for the dignity of his bearing in the lecture-room, his great learning, and uncommon lucidity as a teacher of anatomy and physiology. Dr. Latham, one of his most enthusiastic followers and biographers, says: "He so eloquently expounded some of the highest truths of science, so nicely disentangled the perplexities of abstruse subjects, and made that so easy which was before so difficult, that every man who heard him feels, perhaps, to this day that for some of the most important points of his knowledge he is indebted to Mr. Abernethy. It seems strange that in connection with a public life of indefatigable uses and a private character held in the highest estimation by all his friends and acquaintances, Mr. Abernethy should seem to have studied how to succeed best in making himself personally disagreeable to his patients.

The many anecdotes current of his rudeness and brusquerie may be, and in all probability are, much exaggerated; but it is quite certain that he took pains to veil the real excellencies of his character by a coarse, rude exterior to his patients; indeed, his abrupt manners seemed to have had their influence in setting an unfavorable example to many of his successors, and to have started the paradoxical idea that to be a great surgeon it is necessary to be a great brute, and to obtain a reputation for skill in medicine it is advisable to go to school to a bear. In these respects no two human beings seem to have formed a stronger contrast than the amiable Sir Astley Cooper and the ungenial Mr. Abernethy. Both, however, made a deep and important mark upon their time and generation, and the world of medical science is vastly indebted to both for their achievements in art, their admirable teachings, and valuable writings.

Physiological students remember with ever-increasing gratitude and interest the names of Bichat, an eminent French physiologist, born in 1771, and Sir Charles Bell, the illustrious Scotch physiologist, born in 1774.

To both these great observers, writers, and thinkers medical science owes revelations concerning the brain, nervous system, and the functions of human life which can never be too highly appreciated.

Without entering in detail upon the physiological researches of Bichat and Sir Charles Bell, it is enough to say that, since their writings and teachings were given to the world, much of the mystery of the nervous apparatus and its functions has been cleared away, and without them the physiologist would still be in profound

darkness concerning many most important branches of knowledge in regard to nervous action and other important physiological movements of the human structure. John Bell, the brother of Sir Charles, acquired a great reputation as a surgeon, and his anatomical treatises are highly esteemed by scientists, but the brilliant lustre of his brother's renown as a physiologist serves to obscure rather than to illuminate the services of this really profound and talented surgeon.

It is now time that we should make mention of one who, though by no means connected with the progress of medical science, has developed a theory which cannot fail to throw light at some future time upon the mysterious relations between mind and matter, and contribute valuable suggestions to the realm of physiological as well as psychological science.

We speak of the phrenological discoveries of Dr. Gall, a great and learned scientist, who was born in Suabia in the year 1758.

Dr. Gall commenced his remarkable observations upon the association of special characteristics of mind with certain cranial developments in his earliest school-days. He often used to describe in later years how invariably he was beaten in his studies by those of his school companions whom he called "bull-eyed fellows." His wonderful tact in describing character, and associating its indications with facial and cranial peculiarities, procured for him quite a reputation, whether at school, college, or wheresoever he went.

Studying medicine at Vienna, he became alternately feared and applauded by all his associates for his invaluable exactitude in the delineation of character.

Following up his experimental observations from living faces and heads to the dissection of human and animal brains, Gall at length evolved a system which, in his own experience at least, proved as correct as it was wonderful to all who heard his lectures and followed the course of his astonishing delineations.

In 1800 Dr. Gall received as a pupil Dr. Spurzheim, and the extraordinary capacity of this great scientist for mastering and enlarging upon his instructor's views rendered their names a synonym, so invariably associated together that it is difficult to say to which the most elaborate treatises upon phrenology are really due.

The new science was at first received with immense enthusiasm by all classes, and the learning of Spurzheim and the fascinating eloquence of Gall succeeded in winning converts among the most profound thinkers, as well as in the *salons* of fashion. The tide of popular favor, however, received a temporary check from the adverse report pronounced against phrenology by the *savants* of the French Institute, whom Napoleon Bonaparte most unwisely commissioned to inquire into its merits.

As this Institute, like other learned bodies, had most commonly pronounced against all new ideas which did not originate from its own members, the dictum did not annihilate the claims of Gall and Spurzheim, nor long continue to dim their reputation, and in all probability, at this day, nobody knows or nobody cares whether the Institute indorsed or denounced them at all. The learned Germans kept their onward course, and though the science of medicine has not as yet benefited by their suggestive theories, that of psychology has, and in some more fully unfolded condition of the art,

there can be no doubt that important results to physiological diagnoses will arise from a connection of this and all other kindred forms of science. It only remains for us now to notice the entrance upon the scene of the learned Hahnemann, whose system of homœopathic practice almost divides the palm with that of allopathy.

Dr. Samuel Hahnemann was born in Upper Saxony, in 1755. He was educated for the medical profession at Leipsic, and practiced for many years with distinguished success and high repute. It is confidently affirmed that Dr. Hahnemann had long cherished a feeling of deep dissatisfaction with the practices of allopathy before he chanced upon his own great discovery.

Report also alleges that he felt deeply the responsibility which belongs to the medical practitioner, and so keenly realized the failure of drugs to restore the disturbed system in disease that he was accustomed to put on mourning whenever a patient died, and accuse himself of every failure in his treatment, as if he were responsible for the lives of those under his care.

As it would not be possible in this place to give any extended account of homœopathy, whilst the system itself is too widely accepted to be dismissed with a mere passing notice, we shall add an extract from Dr. Stratten's preface to the first edition of the English translation of Hahnemann's "Organon."

Speaking of the illustrious founder of the system, Dr. Stratten says,—

"A most accurate observer, a skillful experimenter, and an indefatigable searcher after truth, he appeared formed by nature for the investigation and improvement of medical science. On commencing the study of

medicine, he soon became disgusted with the mass of contradictory assertions and theories which then existed. He found everything in this department obscure, hypothetical, and vague, and resolved to abandon the medical profession. Having been previously engaged in the study of chemistry, he determined on translating into his native language the best English and French works on the subject. Whilst engaged in translating the Materia Medica of the illustrious Cullen, in 1790, in which the febrifuge virtues of cinchona bark are described, he became fired with the desire of ascertaining its mode of action. Whilst in the enjoyment of the most robust health, he commenced the use of this substance, and in a short time was attacked with all the symptoms of intermittent fever, similar in every respect to those which that medicine is known to cure. Being struck with the identity of the two diseases, he immediately divined the great truth which has become the foundation of the new medical doctrine of homœopathy.

"Not contented with one experiment, he tried the virtues of medicines on his own person, and on that of others. In his investigations he arrived at this conclusion: that the substance employed possessed an inherent power of exciting in healthy subjects the same symptoms which it is said to cure in the sick. He compared the assertions of ancient and modern physicians upon the properties of poisonous substances with the result of his own experiments, and found them to coincide in every respect; and upon these deductions he brought forth his doctrine of homœopathy. Taking this law for a guide, he recommenced the practice of

medicine, with every prospect of his labors being ultimately crowned with success.

"In 1796 he published his first dissertation on homœopathy in *Hufeland's Journal.* A treatise on the virtues of medicines appeared in 1805, and the ORGANON in 1810. Hahnemann commenced as a public medical teacher in Leipsic, in 1811, where, with his pupils, he zealously investigated the effects of medicines on the living body, which formed the basis of the Materia Medica Pura, which appeared during the same year. Like many other discoverers in medicine, the author of the ORGANON has been persecuted with the utmost rigor; and in 1820 he quitted his native country in disgust. In retirement he was joined by several of his pupils, who formed themselves into a society for the purpose of prosecuting the homœopathic system of physic, and reporting their observations thereon. Several fasciculi detailing their labors have since been published.

"Of the doctrine of homœopathy generally, I have little more to add in this place; time will develop the truth or fallacy of the principle on which it is founded; but, in the meantime, let us not lose sight of the fact that this new system of physic is spreading throughout the continent of Europe with the rapidity of lightning. Germany, Austria, Russia, and Poland have already done homage to the doctrine, and physicians have been appointed to make a specific trial of its effects, the results of which are unequivocally acknowledged to be of a favorable nature. The writings of the illustrious Hahnemann have appeared in five different languages, independent of the present version of his ORGANON; and in France alone, a translation of this work, from

the pen of A. J. L. Jourdan, member of the Académie Royale de Médecine, has reached a fourth edition.

"Convinced, from reflection and observation, of the value of homœopathy, the first step in the propagation and dissemination of this doctrine, in Britain, was to obtain an English version of the ORGANON."

It would be a work better suited to the genius of an industrious cyclopædist than the writer of a plain manual like this, to attempt numbering up all the "systems," so called, that have sprung into a temporary and fleeting popularity during the last century in the direction of healing. Besides the well-known and widely-practiced methods included in the general term "allopathy" and the more special mode prescribed by homœopathy, there are hydropathists of various descriptions, who place different degrees of curative virtue in springs, baths, packs, hot and cold water treatments, taken now internally, now externally, then together and then separate; vegetarian healers, herb-doctors, counter-irritation healers, and healers by jumping, lifting, dancing, fencing, the practice of light and heavy gymnastics, and movement curers; abstainers, feeders, milk-diet doctors, fruit-diet doctors, psychologic, psychopathic, magnetic, and every other imaginable kind of healing system that the diseased condition of humanity and the easy character of its faith, or perhaps we might more justly say the despair of its desperate necessity, can suggest. To all and each, there have been a sufficient number of adherents to confer upon the passing experiment some interest; but all except the long-tried and deeply engrafted systems of allopathy and the widely diffused methods of homœopathy

appear destined to become the ephemera of the day, and pass away like the fashion of the hour in vanity and vexation of spirit. Our readers will doubtless ask where in this long category of systems and claims for systems do we place the subject of this book, namely, electro-magnetism? We answer, nowhere as yet,—that is, as a system. Electricity and magnetism are original forces, or original parts of one universal force, and, being as old as creation, their uses are simply dependent upon the degrees of intelligence with which the age is prepared to apply them.

We have already made claim for electricity as being, if not the veritable life-principle in man, at least its analogue, and the nearest approach to it we can ever find in nature outside of man. We need not go over the ground of these arguments again; suffice it that, being as we have claimed the life itself, it must be also the restorer of life and the restorer of life's disturbed functional activities.

Its application as a therapeutic agent is, however, something very different from our recognition of its inherent virtues and powers. How far we can command its agency as a successful healer must depend upon how far we can learn to adapt it to the human system, engraft upon it scientific modes of application, and put it to its real use as a healing power.

That it can effect much in this direction has not only been proved again and yet again, but the proofs are multiplying daily on every side of us. Living bodies are struck dead by lightning, and half-dead bodies, as in paralysis, are restored by it.

Franklin, Galvani, Volta, Aldini, Colomb, Matteucci,

and hosts of modern scientists, pour in their wealth of testimony to its powers and possibilities over the nerves and muscles of the dead and living both.

Antoine Cæsar Becquerel, the distinguished French physician, naturalist, engineer, and electrician, has written a vast number of fine treatises upon the nature of electricity, and his researches in the direction of electrical action as a motor in vital functions are equally curious and suggestive. But, after all, experience is one of the best of discoverers, one of the most convincing logicians, that the world has ever listened to. Experience is more and more surely demonstrating day by day that electricity is a great and a wonderful therapeut, and that, when properly understood and carefully applied, it must take rank as the world's best, surest, perhaps only, healer, and that, just as soon as science has mastered the rudimental laws by which it operates on and through living tissues.

And now we bring our review to a close. Medicine is at present hardly pursued as a system at all. It is recognized to have been a long and hazardous succession of experiments throughout its eventful history. No infallible specific, either in medicine or surgery, has yet been found, save now and then a healing herb, balm, or drug, and that only in application to certain, or rather uncertain, human temperaments. The poor animals, who search for grasses and herbs as medicines in special conditions of disease, act under the promptings of instinct with a wisdom which far exceeds our blundering experiments. That food, choice of diet, habits of life, clothing, airs, and all the details that constitute hygiene, should have been taken into ac-

count in far higher degrees than they have been, every day's experience is helping to demonstrate. When, therefore, we write slightingly of systems, methods, and curative arts, we do so because we feel the importance of urging that they should one and all be treated as matters of secondary and not primary moment, in the preservation of human life and health. Hygienic lives and hygienic systems first, and remedial arts next, is our motto, and this on the principle that prevention is better far than cure. If disease, however, supervenes, and the functions of hygiene as a preventive are balked, we should then seek for the best, most natural, reasonable. and vitally assimilated methods of cure. Hitherto we have only been experimenting in the hope of finding this superexcellent mode. Great learning, world-wide research, vast skill, genius, industry, long lives of patient toil, whole generations of earnest devotion, and centuries of ever-increasing light upon therapeutic possibilities, have marked man's progress in the history of medicine. Anatomy and physiology have meanwhile dawned upon the toilers of the ages, in compensation for their vast expenditure of life-service; and if, at the close of all, the science of life and vital force should reward them with another and grander revelation, their labors will not have been undertaken in vain, and the history of medical science will bring us face to face at last with the solution of creation's profoundest problem, namely, the mystery of the life-principle and its application in the form of electricity to the reduction of those disorders which, commencing with a disturbance of electric force, can only be conquered by electric force.

CONCLUDING CHAPTER.

A REVIEW.

GLANCING back over the ground the author and reader have traversed together in this volume, we see, indeed, that "a new path in electrical therapeutics" has been opened up before us, and the beginning of possibilities incalculable in point of use, blessing, and scientific discovery, are dawning upon us.

The theories of ancient philosophers, the speculations of sages, and the chance discoveries of time-honored scientists, all seem to have matured under the sunlight of modern progress, until the indications afforded by the half-mythical, half-real narrations recorded in the days of antiquity, take on substantial forms, and the magnesian-stone of old becomes the load-stone of to-day; the fabled deities of the skies resolve themselves into impersonations of the powers of nature; the dreams of the alchemists are realized in the discoveries of electricians; and the therapeuts of ancient Egypt build temples which Mesmer, Franklin, Duchenne, Becquerel, and Morse convert into store-houses for the conserved forces of life, health, science, and mental power.

My claims as set forth in this volume are simply for the discovery of a new application of a power recognized in all ages, and in all ages indicative of this same new path in electric therapeutics. The healers

or therapeuts of old perceived the possibility of using magnetism as a remedial agent. Their followers have ever turned with wistful eyes to the realms of the imponderable to find that philosopher's stone, the existence of which has been so long felt yet so long hidden from the eager researches of philosophy.

My electrical cranial diagnosis, and the application of different currents to different forms and conditions of disease, are but way-marks on the path of progress. Both these methods of applying the force take the uses of electricity out of the hands of unskillful charlatans and unscrupulous experimenters, and prove that the same mathematical precision in the adjustment of means to ends, by which the Atlantic telegraph has been successfully established, is equally necessary to render electricity a safe and reliable remedial agent. My system has proved also the great anthropological fact that the brain is the chart of the body and the correct record of all its complex motions and states.

By the protest I have herewith recorded against the unscientific use of electricity, and by the proofs I offer in well-attested cases of cure through the scientific use of electricity, I cannot doubt but that I shall be at least measurably instrumental in stimulating earnest and capable minds to fresh research, and beneficent medical practitioners to amended systems of practice in connection with this great remedial agent. I have often heard it alleged that John Wesley, the great and good founder of Methodism, had not only directed his attention to the uses of electricity as a remedial agent, but also that he had frequently applied it with marked success to numbers of suffering organisms.

In reviewing some records wherein I expected to find data for what I had been orally informed of on this subject, I came across the following striking excerpts from a fashionable and high-toned English paper entitled *Belgravia*, in which appear, under date of December, 1872, these passages:

"And yet electricity is life! It is the very soul of the universe! It permeates through all space, surrounds the earth, and is found in every part of it. Unlike many human specimens, it never desires to keep all its good to itself, but is ever ready to diffuse its beneficence. It is only in abnormal conditions and in unexpected rencontres that it displays itself in that brilliant flash and that deafening roar with which its majestic force yields up its great spirit.

"Two conditions of the human body also are illustrative of its varied action. A person who has the smallpox cannot be electrified, while sparks of electricity may be drawn from the body of a patient dying of cholera. In the first instance, it appears that the body is fully charged with its own electricity, since it is impossible to electrify a body beyond a certain degree; in the latter there seems to be a tendency to part with the electrical force which is essential to the support of life, and which may account for the distressing and rapid weakness of cholera patients.

"Undoubtedly, however, the greatest marvels of this beneficent agent are to be found in its influence on the human frame and in the cure of disease. But, like everything that is destined eventually to be accepted by the public, as a matter of course it has had to pass through the usual three stages of contempt,

controversy, and adoption. More than a hundred years ago John Wesley said, 'How much sickness and pain may be prevented or removed, and how many lives saved, by this unparalleled remedy! And yet with what vehemence has it been opposed!—sometimes by treating it with contempt, as if it were of little or no use; sometimes by arguments, such as they were; and sometimes by such cautions against its ill-effects as made thousands afraid to meddle with it.' And he thus sums up his opinion of the medical profession and their opposition to the use of electricity in disease: 'There cannot be in nature any such thing as an absolute panacea,—a medicine that will cure every disease incident to the human body. If there could, electricity would bid fairer for it than anything in the world. Mr. Lovett is of opinion that the electrical method of treating disorders cannot be expected to arrive at any considerable degree of perfection till administered and applied by gentlemen of the faculty. Nay, then, QUANTA DE SPE DECIDI! all my hopes are at an end. For when will it be administered and applied by them? Truly, AD GRÆCAS CALENDAS. Not till the gentlemen of the faculty have more regard to the interest of their neighbors than their own. Therefore, without waiting for what probably never will be, and what indeed we have no reason to expect, let men of sense do the best they can for themselves, as well as for their poor neighbors. I doubt not but more nervous disorders would be cured in one year by this single remedy than the whole English MATERIA MEDICA will cure by the end of the century.'

"John Wesley was indeed prophetic when he wrote

in 1759: 'It is highly probable a timely use of this means might prevent, before they were thoroughly formed, and frequently even then remove, some of the most painful and dangerous distempers,—cancers and scrofulous humors in particular,—though they will yield to no other medicine yet discovered. It is certain nothing is so likely, by accelerating the contained fluids, to dilate and open the passages as well as divide the coagulated particles of blood so that the circulation may be again performed. And it is a doubt whether it would not be of more use even in mortification than any other medicine in the world.' "

The above citations show how different is the sentiment among scientific minds in England concerning this important subject from what it was in the days of good John Wesley. Gradually, but certainly, the wisest minds the world over, are growing into a settled conviction as to the importance of the *rôle* played by electricity in the animal economy.

My own practice, with the constantly increasing demands upon me to furnish more light upon the methods of my discovery, all tend to convince me of the great anxiety on the part of the community to push on in the new path of knowledge; and although the incessant demands that are made on my time forbid me to devote my energies to fresh researches, or to extend this simple domestic treatise into the broader fields to which I find the science tending, I know that where I leave off there are numbers of capable minds able and, I trust, willing, to take up the unfinished work. Every fresh revelation, however slight or simple, becomes a stepping-stone to a fresh ascent in the ladder

of progression; I know, therefore, that this unpretending volume and the revelation it contains will form a part of the stepping-stones that will lead suffering humanity into the temple of electrical therapeutics, and though the architect may be forgotten, and the hands that build may be bruised and wounded by the stones which conservatism, learned ignorance, and pedantic presumption hurl against them, if I can but feel that the talent for dispensing light to the scientifically blind, health to the sick, and life to the perishing, has been returned by me with some usury to the great Giver of all good things from whom I received it, my work will be done; this little volume will have fulfilled its mission, and I shall leave my footprints on the sands of time, well satisfied that they have not been made in vain.

AUTHORITATIVE UTTERANCES ON THE SUBJECT OF ELECTRICITY AND ITS IDENTITY WITH THE "LIFE PRINCIPLE."

In the main body of this work I have availed myself but rarely, and in very limited quotations, of any *authoritative* utterances in support of the various positions I have assumed. In contending for the identity of electricity with the long-sought-for "vital principle" in living organisms, I have, perhaps, been too reticent in this respect, and failed to strengthen my case to the extent of my ability, omitting the citation of opinions, the force of which, if given in approximation with my own experiences, might have proved unanswerable.

My chief aim in this little volume has been, however, to present my views in reference to electrical action with all possible directness and simplicity, and leave their reasonableness or fallacy to demonstrate themselves. More especially have I observed this course in reference to my opinions concerning the "vital principle," because I deemed the best interests of therapeutic science were at stake in the matter, and that the identity of that same "vital principle" and electricity should not be received as a mere matter of opinion, but as an accepted fact, derivable from the proofs which identity of phenomenal action between the two elements furnishes us with. If I have succeeded in impressing my readers with the truth of this posi-

tion, they, like myself, will be better prepared to receive and deal with electricity as *the life of things.* Their confidence in its curative virtues will not only be strengthened and confirmed, but their manipulations with the force as evolved in the machines appropriate to healing purposes, will be conducted with all the more care and reverence from their better understanding of its true value.

To such of my readers as may have failed to apprehend the force of the reasons I have offered in support of my opinions, the facts and phenomena from which I evolve them will remain inexplicable; still, they are facts, and as such will ultimately be appreciated at their true value by the thinking part of the community. Having endeavored to do justice to my own convictions by basing them simply on reason, and ignoring authority as the foundation on which to rest for their acceptance, I shall now unhesitatingly present, by way of appendix, a few citations of an authoritative character from a rare and very remarkable work written in 1846, by Mr. T. S. Mackintosh, an English scientist of acknowledged ability, and entitled "The Electrical Theory of the Universe."

The main feature of this treatise is its fidelity to the idea that electricity is the great motor-power of the universe, the life of all things, the source and centre of motion, and the "vital principle" in man, animals, plants, organic and inorganic matter, bodies in space, etc. Among the mass of curious and suggestive matter contained in this work are numerous arguments, strengthened by abundant quotations from esteemed authorities, to prove the identity of electricity with the

"life principle" in men, animals, and plants. As this work is not likely to be attainable to the generality of my readers, and the citations in evidence of the above-named position are felicitous and interesting, I propose to give one or two of these illustrations, confident that their perusal will not be uninstructive or out of place.

The details of the first experiment will recall others of a similar kind with which many of our readers must be familiar; but we give it in this place chiefly because it bears with remarkable significance upon the solution which electrical action affords us of many phenomena hitherto deemed inexplicable.

We preface the narrative with Mackintosh's curt remarks on the opponents with whose opinions he, like myself, has had to contend,—doing battle, as I have, by aid of facts *versus* theories.

"But it will be said that all this, though true, must be viewed in connection with the 'vital principle.' And what are we to understand by this expression, 'vital principle'? If we consider it attentively, we shall very soon discover that it is one of those vague, commonplace phrases that pass current among men, and which serve rather to cover our ignorance than to advance our knowledge. When we endeavor to trace the 'vital principle' to the nervous energy, and the nervous energy to electrical action, we at least endeavor to put our system in a tangible form; but when we profess to explain the animal functions by a 'vital principle,' our explanation is mere verbiage.

"We have already said that the animal system is a bundle of circles, each connected with the others like the wheels of a watch, or like the different parts of the

steam-engine; and that the primary circle, the main-spring, which may be said to originate the animal functions, is the nervous, and that the nervous circle is actuated by electrical agency. The proof of this is derived from plain and simple facts.

"The following extract is from the letters of Sir David Brewster on 'Natural Magic'; and, viewed in connection with the generation of animal force in the lungs, might furnish the basis of a curious and interesting inquiry:

AN INDIVIDUAL RAISED ON THE FINGERS OF FOUR OTHER PERSONS.

"'One of the most remarkable and inexplicable experiments relative to the strength of the human frame, which you have yourself seen and admired, is that in which a heavy man is raised, with the greatest facility, when he is lifted up the instant that his own lungs and of the persons who raise him are inflated with air. This experiment was, I believe, first shown in England a few years ago by Major H., who saw it performed in a large party at Venice, under the direction of an officer of the American navy. As Major H. performed it more than once in my presence, I shall describe, as nearly as possible, the method which he prescribed. The heaviest person in the party lies down upon two chairs, his legs supported by one and his back by the other. Four persons—one at each leg and one at each shoulder—then try to raise him, and they find his dead weight to be very great from the difficulty they experience in supporting him. When he is replaced in the chair, each of the four persons takes hold

of the body as before, and the person to be lifted gives two signals by clapping his hands. At the first signal he himself and the four lifters begin to draw a long and full breath, and when the inhalation is completed, or the lungs filled, the second signal is given for raising the person from the chair. To his own surprise and that of his bearers, he is raised with the greatest facility, as if he were no heavier than a feather. On several occasions I have observed that when one of the bearers performed his part ill, by making the inhalation out of time, the part of the body which he tries to raise is left, as it were, behind. As you have repeatedly seen this experiment, and have performed the part both of the load and the bearer, you can testify how remarkable the effects appear to all parties, and how complete is the conviction either that the load has been lightened or the bearers strengthened by the prescribed process.

"'At Venice the experiment was performed in a more imposing manner. The heaviest man in the party was raised and sustained upon the points of the forefingers of six persons. Major H. declared that the experiment would not succeed if the person lifted were placed on a board, and the strength of the individuals applied to the board. He conceived it necessary that the bearers should communicate directly with the body to be raised. I have not had an opportunity of making any experiments relative to these curious facts; but whether the general effect is an illusion, or the result of known or of new principles, the subject merits a careful investigation.'

"In the present chapter we propose to show that the vital energy is to be ascribed to galvanic action; and

in doing so we shall confine ourselves chiefly to a statement of facts. To enter into an inquiry concerning the *manner* in which the electrical energy is transmitted to the living animal function, would, from the nature of the subject, require a long and elaborate train of previous inquiry; we must, therefore, for the present, be contented with bare facts, which are, after all, the basis of science.

"According to Ritter, the electricity of the positive pole augments, whilst the negative diminishes, the action of life. Tumefaction of parts is produced by the former; depression by the latter. 'The pulse of the hand,' he says, 'held a few minutes in contact with the positive pole, is strengthened; that of the one in contact with the negative, is enfeebled;—the former is accompanied with a sense of *heat;* the latter with a feeling of *coldness.* Objects appear, to a positively electrified eye, larger, brighter, and red; while to one negatively electrified they appear smaller, less distinct, and bluish,—colors indicating opposite extremities of the prismatic spectrum. The acid and alkaline tastes, when the tongue is acted on in succession by the two electricities, are well known, and have been ingeniously accounted for by Sir Humphry Davy, in his admirable Bakerian lectures. The smell of oxymuriatic acid, and of ammonia, are said by Ritter to be the opposite odors excited by the two opposite poles, as a full body of sound and a sharp tone are the corresponding effects on the ear. But unquestionably the most precise and interesting researches on the relation between voltaic electricity and animal life are those contained in Dr. Wilson Philip's 'Dissertations in the Philosophical

Transactions,' as well as in his 'Experimental Inquiry into the Laws of the Vital Functions.'

"The eight pair of nerves distributed to the stomach, and subservient to digestion, were divided by incisions in the necks of several living rabbits. After the operation, the parsley which they ate was removed without alteration in their stomachs; and the animals, after evincing much difficulty of breathing, seemed to die of suffocation. But when, in other rabbits, similarly treated, the galvanic power was transmitted along the nerve below its section to a disk of silver placed closely in contact with the skin of the animal, opposite to its stomach, no difficulty of breathing occurred. The voltaic action being kept up for twenty-six hours, the rabbits were then killed, and the parsley was found in as perfectly digested a state as that in healthy rabbits fed at the same time; and their stomachs evolved the smell peculiar to that of a rabbit during digestion. These experiments were several times repeated with similar results; hence it appears that the galvanic energy is capable of supplying the place of the nervous influence, so that, while under it, the stomach, otherwise inactive, digests food as usual. Dr. Wilson Philip concludes that the identity of galvanic electricity and nervous influence is established by these experiments. The general inferences deduced by him from his multiplied experiments are, that voltaic electricity is capable of effecting the formation of the secreted fluid, when applied to the blood in the same way in which the nervous influence is applied to it; and that it is capable of occasioning an evolution of caloric from arterial blood. When the lungs are deprived of the nervous

influence by which their function is impeded, and even destroyed; when the digestion is interrupted by withdrawing this influence from the stomach, these two vital functions are renewed by exposing them to the influence of a galvanic trough. 'Hence,' says Dr. Philip, 'galvanism seems capable of performing all the functions of the nervous influence in the animal economy.'"

Then follows an account of the oft-quoted experiments performed by Dr. Ure on the body of a condemned murderer hanged at Glasgow. This detail we omit, both on account of its frequent citation in other works, doubtless familiar to the reader, and also because its harrowing particulars are painful enough to excuse our dispensing with their reiteration. The author of the treatise from which I quote winds up his narrative with the following concise words of summary:

"These experiments are sufficient to satisfy any reasonable mind that electrical action is the great moving principle in the animal economy."

In this connection we feel impelled to republish once more for the benefit of candid and unprejudiced minds, a relation of those famous experiments concerning the origin of animal life which some thirty years ago excited so much attention in the scientific world, and the rationale of which has never yet been explained away, although numerous attempts have been made to do so, by the very unphilosophical and illogical methods of ridicule and scoffing. We are again indebted to Mr. Mackintosh for the narrative, which we extract *verbatim* from his valuable work.

"'The public are aware that Mr. Crosse has been

recently pursuing a series of researches into the process of crystallization, by means of his galvanic batteries, and that he has made discoveries which have thrown quite a new light upon science. Some weeks ago he prepared a silicious fluid for the purpose of crystallization. He heated a flint to a white heat, and then plunged it in water to pulverize it. The silex, thus reduced, was saturated to excess with muriatic acid. The mixture was placed in a jar, a piece of flannel was suspended in it, one end of which extended over the side, and thus, by capillary attraction, the liquor was slowly filtered, fell into a funnel, and thence dropped on a piece of ironstone from Mount Vesuvius, upon which were laid the two wires connected with either pole of the battery. We should state that the ironstone had been previously heated to a white heat, so that no germs of life could have existed upon it. Mr. Crosse made his daily observations of the wires, to discover the beginning of the process of crystallization. On the fourteenth day he saw some small white specks upon the stone. Four days afterwards they had elongated and assumed an oval form. He concluded that they were incipient crystals. Great was his surprise on the twenty-second day, to find eight legs projecting from each of these white bodies; still, he could not believe that they were living beings. But on the twenty-sixth day his surprise was complete; there could be no doubt, they moved, they fed, they were perfect insects. Eighteen or twenty of them have since appeared. Many have seen them, but there is no record of such an insect. It is in form something like a mite; it has eight legs, four bristles at the tail, and the

edges of the body are very bristly; its motions are visible to the naked eye; its color is gray; its substance is pulpy. It appears to feed upon the silicious particles in the fluid.

"'The most extraordinary circumstance in this phenomenon is the nature of the fluid in which this insect lives and thrives. The acid instantly destroys every other living being.

"'But a second trial has confirmed the fact beyond a doubt. Another portion of silex was prepared in the same manner, and reduced to a gelatinous form, but without the acid. A coil of silver wire was suspended in it from one of the poles of the battery, and the other pole was also immersed, so as to send through the mass an incessant stream of the electric fluid. About three weeks afterwards, Mr. Crosse examined the poles to search for crystals, and in one of the coils of wire he found one of these strange insects. This proves that it is produced from the silex, and not from the acid.'

"'Mr. Crosse, with his usual modesty, has contented himself with stating the fact, without attempting to account for it. He is in correspondence with Professor Buckland upon the subject, and the learned professor has suggested an explanation, which it will be for future observers, by repeated experiments, to confirm. We should state that the insects were principally found at the negative pole of the battery.'

"A great body of similar facts might be adduced, if necessary, tending to show that all animal *motion* may be traced to *electrical action;* enough has, however, been advanced to satisfy those who are willing to be

convinced; those who are unwilling, may fall back upon the 'vital principle,' or some ethereal or spiritual essence, if to their minds such essence furnishes a more satisfactory solution. We do not hope to convince those who are stubbornly bent upon explaining the mysteries of nature, by introducing other mysteries still more incomprehensible than those which they profess to explain. We should not have entered upon the subject but that we are firmly persuaded that before we can hope to elevate the physical and moral condition of man, we must carefully and minutely investigate the laws by which his physical nature is governed, and thereby we shall obtain a sound basis for our moral structure."

The limitations of our space forbid any further extracts, either from the interesting work above quoted or others in support of similar views. On the facts presented we offer no comments; they tell their own story in sufficiently forcible language. Our purpose is answered when we find ourselves in a position to gain the confidence of those whom we most desire to interest, namely, the patients whom it is our province to heal by electricity; and this we are far better able to do when they themselves realize the true nature of the force with which we deal, and esteem sufficiently the curative virtues, renovating properties, and vital qualities of the divine agent which a beneficent Creator has disclosed to human ken for the upbuilding of the suffering human structure.

SUPPLEMENT TO AUTHORITATIVE UTTERANCES.

SINCE the first edition of this volume I have been very much interested in a desultory synopsis of Dr. Ferrier's authoritative investigations and experiments in the same paths which led me, as far back as 1848, to conclude that the nature and seat of disease could be correctly ascertained from Cranial Diagnoses with Electricity as the searcher. As the brain is the great nerve-centre and focal point to which all sensor and motor nerves report themselves, should be the map on which the organs and their special conditions are represented. Proving the correctness of this hypothesis by my established system, notwithstanding the ridicule pedants bestowed upon my empiricism, it is gratifying to retrospect the familiar roadway of research and empiricism leading to the goal the science of sciences habitates—with Dr. Ferrier. Although as yet Dr. Ferrier has not the temerity to assume the responsibility of demonstrating his theory upon human beings, for which I have won and worn the title of *mad woman* in my claims as set forth in long years of practice as the discoverer of an infallible method of Electrical Cranial Diagnosis, I am honored when such an authoritative personage as Dr. Ferrier should at the instance of Prof. Huxley persuade the Royal Society in England to come forward handsomely and vote a

grant to carry out his experiments on *monkeys*, if not on mankind, for the English scientists proclaim "the monkey is the nearest approach to man in the animal kingdom; and as it is of course out of the question to experiment on men, the monkey will form an adequate substitute." Here it will be in order to reassert boldly and fearlessly that Electrical Cranial Diagnosis is an exact science applicable to the human organism beyond a doubt, as proven in my long years of practice and instruction to others.

Electrical Cranial Diagnosis is one of the exact sciences, elevating the system of therapeutics and pathology beyond empiricism to the pedestal of mathematics, far beyond half-formed speculations and symptomatic indications, revealing the hidden mysteries of human organisms to the searching eye of the realist, requiring no adequate substitute for mankind in the form of monkeys to asseverate the unerring determination of electrical detection of disease and conditions of the human organism, as mapped out on the chart formed by the brain.

It seems the grandest achievement of a calumniated career of over quarter a century, wherein I have frequently been tabooed as mad when striving to bring into popularity one of the greatest strides in anthropology this age has recorded, that I have been the pioneer for men of *authoritative sense* and acknowledged scientific persuasion in this country and Europe. The torch of a mad woman may have enlightened the world, although the possibility that such a system of diagnosis could be made through the agency of electricity has long and vehemently been denounced.

Without further comment, I subjoin the following, taken from the Dundee Advertiser's London correspondent:

"For some time the scientific world has not been startled and rejoiced by any very great scientific discovery, but at the present moment we are on the eve of the publication of one of the greatest scientific discoveries of the present age. The happy man who has struck on a new and rich vein of scientific truth comes from the Granite City, and is a very distinguished alumnus of the university of Aberdeen. Dr. Ferrier, who was some time ago appointed successor to Dr. Guy, in the chair of Forensic Medicine in King's College, London, has just crowned the study of years by a most happy and brilliant series of experiments. Dr. Ferrier was a successful student of philosophy, and gained the Ferguson scholarship in Glasgow before he studied medicine. It was probably his acquaintance with Professor Bain's psychology that led him to give special attention to the physiology of the brain, and his graduating thesis on the brain, for which he obtained a gold medal, proved that he had already entered on the study in which he is destined to acquire enduring fame. He has never lost sight of the object to which he attached himself so early, and has been for a considerable time thoroughly up to the most advanced knowledge. About a month ago his plans were so far complete that he was ready to begin his experiments with the Easter holidays. By the invitation of Dr. Crichton Brown he went to Wakefield, and was amply provided with cats, dogs and other animals for his experiments. The results astonished himself, and it is not too much to say

that during the last month more has been discovered regarding the action of the brain than all the preceding knowledge. Physiology is, therefore, on the eve of an extraordinary advance. What Gall and Spurzheim groped after in a loose and empirical fashion is now established on the sure ground of experiments. The *modus operandi* is new and ingenious. The animal to be experimented on is first put under chloroform. The next thing is to clear away the skull and expose the brain. This, it will be understood, is a difficult and delicate operation, and the animal may live from three hours to four days. All this has been done often enough before, but the difficulty was to get some mode of rousing parts of the brain into activity without injuring the parts. The process employed by Dr. Ferrier is what is known as faradizing. After uncovering the brain, he applies the point of an electrode to the convolutus of the brain. Its effect is to excite the functional activity of that part, and thereby to show what its real work is. One of the first experiments disclosed the part that is employed in wagging the tail. Soon after the centres engaged in supplying the limbs, the mouth, head, etc., were discovered, and already Dr. Ferrier has succeeded in almost completing a map of the brain, with all its organs distinguished by the sure and rigorous test of experiment. Nothing could surpass the interest of those experiments. On the table before you is the dog, with the skull removed. All seems, but for the breathing and movement of the brain, an inert mass of dead matter. The doctor applies the electrode, and presently the tail begins to wag. All else is motionless. Another touch, and its forepaw is

stretched out; another, and its head is erected: another, and its mouth opens.

"Again the magic wand touches the brain, and the animal seems convulsed with fear and rage, and so on the experiments go. Once the divining rod has been discovered, it is comparatively easy for an expert vissicator to use it. This discovery so simple, once known, will effect almost a revolution in physiology. One of the chief results attained by Dr. Ferrier is the belief that each convolution is a separate organ, although occasionally several may be conjoined for common work. He also finds that the great motion centres are collected in the front part of the brain—a result that shows the phrenologists were not far out in that quarter. It has also demonstrated that the nerves moving the muscles of the jaw are just above the ear, where the phrenologists place gustativeness. But other experiments make sad havoc with the locality of many of the "bumps." The most singular of all the experiments is one proving that one of the main uses, if not the sole one, of the cerebellum is to supply the muscles of the eye. This is an extraordinary confirmation of one of Professor Bain's most characteristic views. But the most important immediate effect of Dr. Ferrier's discovery will be an improved treatment of diseases of the brain. It has found out why considerable portions of the brain may be diseased without interfering with sanity, and why other lesions produce epilepsy. It has succeeded in artificially producing epilepsy in a dog. This is a most wonderful part of the discovery, and proves the truth of the conjecture of Dr. Hewlings Jackson, that epilepsy arises from a lesion between two

convolutions of the brain. Dr. Ferrier has also found out the origin of chorea, or "St. Vitus' dance," and has been able to make his animals show all the symptoms of the disease artificially. He has caused tetanus and other peculiar and difficult states of the muscular system. Curiously enough, Dr. Ferrier's discovery coincides with another almost essential to its practical success. Anatomists have warned phrenologists that they erred in taking the outward shape of the skull as indicating the shape of the brain. The skull varies considerably, and it is impossible to say of any particular part that the brain is such a distance below. Nevertheless, a young anatomist has recently shown that there is a relation between the shape of skull and of the brain, and that it is possible to know what is in the inside of the head without breaking it open. This is most opportune; for when Dr. Ferrier has mapped out the brain, it will be possible to diagnose a man's faculties as easily as tell his shape. We are glad to learn that at the instance of Professor Huxley the Royal Society has come handsomely forward and voted a grant to Dr. Ferrier to carry out his experiments on monkeys. The monkey is the nearest approach to man in the animal kingdom; and as it is of course out of the question to experiment on men, the monkey will form an adequate substitute. Altogether, it is likely that Dr. Ferrier's discovery, beyond any discovery of the present generation, will enlarge the circle of human knowledge and contribute largely to the happiness of mankind."

"IS MEDICAL ELECTRICITY A SCIENCE?"

A LECTURE DELIVERED AT COSMOPOLITAN HALL, PHILADELPHIA, MARCH, 1873, BY DR. ELIZABETH J. FRENCH.

THE following extracts from a lecture delivered by myself on the above subject, will suffice to embody my views on the plea which I feel bound to put in before closing this volume, for the foundation of some school, college, or institution, where the application of electricity to the cure of disease shall be scientifically taught and demonstrated.

"I am aware that the question which forms the subject of this lecture will find an affirmative response in the mind of every thinking man and woman. That the application of electricity to medical uses is as much a form of science as its application to telegraphy, no rational being will attempt to deny; but that the laws of medical electricity are as well understood or as universally practiced as those by which the telegraph is worked, no one will pretend to affirm.

"The only question that remains then is, whether it is as necessary to comprehend and apply the laws governing electrical action in the one case as in the other.

"The answer to this proposition might doubtless be based upon the results,—for example, it could with truth be urged that unless the immutable procedures of law were observed in the application of electricity to the work of telegraphy, there would be no favorable

effect produced; but this stringency of action does not become manifest, it may be added, in *medical electricity*. Here the results are so varied, and range through so many different gradations between absolute failure and perfect cure, that we are not entitled to pronounce upon what the law of electrical application to disease really is. Electricity has been known to kill, as in a stroke of lightning; electricity has been known to cure also, as in the restoration of a paralyzed body, alluded to in this volume; in fact, it is alleged—and that with truth—that the laws which govern electrical action in the realm of mechanics are known, and always found practical and comprehensible, whilst those which operate in therapeutics are comparatively unknown and unmanageable. Then follow the questions, 'Must we abandon the use of electricity altogether as a remedial agent, or, if continued, must it not remain merely the subject of experimental practice?'

"I grant the proposition that electricity regulates itself, and asserts its own authoritative laws in all mechanical action; but in dealing with the human system have we no standard quite as authoritative in the forms of pain and the aggravations of diseased conditions which result from malpractices?

"The telegraph, and every form of mechanical appliance in which electricity is used as a force, are but means to minister to human comfort and convenience, but health and disease are the elements of life and death. Humanity lives and has its being, or perishes and ceases to be, as health or disease wins the victory. What a miserable fallacy is that attempt at logic, then, that would place mechanical art in a higher category

of importance than medical science! Meantime I claim that my thirty years' practice as a healer of the sick, is full of the most direful evidences of the serious injuries (injuries even to the very death) which the hap-hazard application of electricity produces upon the human frame. Conditions of induced paralysis, palsy, loss of sight, hearing, nerve-power, brain-power, tetanus, tumors, contractions, stiff joints, and even mental imbecility, are effects which constantly arise from the merely experimental use of electricity, and evidences of this, constantly force themselves upon my notice from patients who apply to me as a last and desperate resort, only because they hear that I and my students apply electricity on scientific principles, and not in the reckless and unscrupulous modes practiced by unthinking experimenters. In the first place, then, I insist that the human body and the maintenance of its integrity in health is a much more important object than the rapid communication of a message.

"The message may be sent to say that a human being is perishing from malpractice, with the very force that brings the intelligence.

"Better, methinks, care first for the integrity of that human being's physical structure, and inform his mind afterwards.

"The message conveyed to a dead man will not avail much, but the life of the messenger avails everything. Let us not attempt to evade the question at issue with speculations concerning the relative importance of medical and mechanical science. These are points which common sense pronounces upon without any argument at all.

"My position is definite, and limited to three propositions: 1. Are there any laws governing the application of electricity to remedial purposes, and, if so, can we discover and use them? 2. Are there any injurious results produced upon human beings from the disregard or ignorance of the laws of electrical appliances to the cure of disease? and, 3. If medical science and its practice in other departments than electricity, is subject to the supervision of constituted authorities and the restrictions of national and State laws, should not the use of electricity, when applied so largely as it is to the cure of disease, come under the same category of restricted action, and be regulated, like other departments of science, by duly constituted authority?

"Now, although in this lecture I am placing myself in the position both of querist and respondent, and sitting in judgment upon my own propositions, that which I herewith submit I submit publicly, and simply place it before the world for suggestion to others, who may either be disposed to improve upon my affirmations, or put them into such practical shape as will thoroughly test their value.

"To query No. 1, I unhesitatingly affirm that there are not only laws governing the action of electricity upon the diseased organism, but that those laws are so comprehensible, exact, and practical, that I am enabled always to say in dealing with my patients, 'I KNOW what the applications I give, will do for you.' I cannot always promise a cure—all cases are not curable, and accidents intervene: want of care on the part of my patients in following out my instructions may interrupt the action of the force I apply; but all things being equal, and my

directions in hygienic laws and other respects being carefully followed out, I repeat, I am always in a position to say, 'I know what electricity will do for you, as I or my students administer it.'

"I know that such and such points of the body must be dealt with—such and such points avoided. I know that such and such currents must be used, and for such exact periods only—no more and no less. All this I KNOW. I do not believe, or guess at it, and though there is a perfect ocean of unnavigated science yet to sail over in this great realm of electrical force, as far as I have ventured to steer my barque I have avoided the reefs and shoals on which I have seen many a fine constitution shipwrecked, and thus far carried scores of suffering beings to the shores of health and the ports of safety. I venture to affirm, then, that I am in a position to answer the first query propounded, in the affirmative.

"To the second, I should have such a tale of suffering and wrong-doing to narrate, so much ignorance and charlatanism to expose, and so many individual characters to assail, that I must content myself with another affirmative, and that of a general though a most emphatic character.

"There are injurious results produced by ignorant and unskillful applications of electricity to the cure of disease. The evidences of this fact are presented to myself and the community at large every day. They are multiplying around us, too, on every side, and as the uses of electricity become more and more known and more and more appreciated, so do the abuses increase, and the errors of malpractice grow in proportion to the growing popularity of the practice.

"If the two preceding propositions can be accepted by others with the same strength of affirmation as they appear to my own mind, then my third position is already established, and it becomes sufficiently clear that we ought to protect the health and well-being of the community by insisting that the use of medical electricity shall no more be left in unskillful hands than the administration of drugs or the application of the surgeon's knife.

"I have frequently heard it alleged as a reason why it was inexpedient to abolish capital punishment for the crime of murder, that the profound wisdom of civilized law courts could discover no other method of dealing with murderers than by imitating their crime. Now, is it possible that medical practice is reduced to the same pitiful system of expediency, and declines to deal with the pretenders who maltreat a suffering community by the abuse of electricity, because they don't know of any other way to stop the wrong, than by limiting its use to legally qualified medical practitioners?

"In order that my position may not be misunderstood, and that I may not seem in one breath to be pleading for a legally established right to practice electricity, and in the next that I assume legally qualified practitioners commit capital punishment upon the body of electricity, when its use is confined to that distinguished corps alone, I must be permitted to offer a few plain words of explanation. The use of the battery and the working of electric currents in the human system do not form necessary parts of every legally qualified medical practitioner's education. They may or may not do so, but the matter is optional, not obligatory,

with the teachers by whom medical students are prepared, or else it depends upon how far electricity has been admitted as a curative agent by the faculty with whom the student is placed. A still greater drawback to the successful use of electricity, even in hands strengthened by the careful study of anatomical and physiological science, is the fact that the laws of electrical action are not evolved from the routine studies of anatomy and physiology at all. It is one thing to know the place and functions of an organ, and another to determine how it is going to be affected by the use of electricity.

"Again, I am bound to add, and that with all candor and yet respect for the medical profession in general, that I am not aware that its professors have as yet evolved any system in the application of electrical currents, or have given to the world any definite and demonstrable set of instructions concerning the pathological workings of this wonderful force. I know that elaborate treatises have been written on electricity as a curative agent. Some of these I have read, and others I have seen demonstrated in the pernicious and all but fatal results that have accrued to different persons who have followed out their directions; but whether these several treatises contain bane or blessing, whether they are true or false to science, their total lack of agreement, and the fact that the writers most commonly draw their deductions from isolated experiments rather than well-established principles, leave us no reason to determine how far we are safe or otherwise in following the instructions they contain.

"And this conclusion brings us at once face to face

with the fact that a public school or collegiate institute of some kind, is absolutely necessary, where electricity as a science could be studied and taught, and where the teachings promulgated could become the subject of demonstration by the results produced, or of public criticism to all who felt interested in the matter. I would not propose that such an institution should become authoritative until it had proved its right to be so by its successes and orderly methods of treatment; but that which I do claim is, that such an institution is imperatively needed, and that it would form an admirable stepping-stone to the great desideratum of the age, namely, the discovery and application of a scientific method in the use of electricity as a curative agent, the principles of which could be taught and improved upon, until medical electricity would be taken from the realm of experiment and empiricism, and hold its own as *the curative science of sciences.* It may be asked why I make no effort to found such an institution as I hint at, based on my own claims as a discoverer and practitioner.

"I answer, because my hands are already full to overflowing with the demonstrable facts of my practice; because, moreover, whilst I can teach and demonstrate, I may not be gifted with the genius of organization, whilst I know for a certainty I am not endowed with the financial means necessary for the establishment of such a work. Each craftsman to the accomplishment of his special mission. Mine is to discover the path, and point the way. If competent road-makers and builders will work after me in the direction which it has been my special privilege to find available for the purpose, I do not doubt but that, ere long, Philadelphia

may rejoice in being the first city of civilization to inaugurate electrical medical colleges; the first pioneer to open up to mankind the incalculable blessing of having found, delineated, and crystallized into a science, 'the way of the life-lightnings,' and pointed humanity in the safe, reliable, and scientific 'New Path in Electrical Therapeutics.'"

LIST OF REFERENCES.

BEFORE calling the reader's attention to the few remarkable cases of cure which I select from hundreds of others, equally well attested and striking, I submit for consideration the following list of eminent and distinguished names, to any or all of whom I am permitted to refer in evidence that either in their own persons, or those of some members of their families or social circle, I have effected, by my system, such cures as command their esteem and kind acknowledgment: in proof whereof, they cheerfully append this their unqualified endorsement of the value of my treatment and methods:

THE RIGHT HONORABLE THE EARL and COUNTESS OF CAITHNESS, Portland Place, London, England, and Barrogill Castle, Caithness County, Scotland.

THE COUNT DI MEDINA POMAR, Portland Place, London, England.

A. L. WARNER, M. D., New York City.

Mr. and Mrs. W. H. BURROUGHS, New York City.

J. GURNEY, Photographer, New York City.

FRANK H. NORTON, New York City.

IRVING VAN WART, New York City.

H. O. BAKER, New York City.

Rev. CHAS. HOUGHTON, Buffalo, N. Y.

WM. GARDNER WETHERBY, New York City.
General JOHN A. LEWIS, Buffalo.
Colonel FOX, Buffalo.
Mr. CHARLES RICHARDSON, Auburn, New York.
Captain SEABURY, Boston.
Dr. PATTEE, Boston.
DAVID THAYER, M. D., Boston.
Dr. GILBERT, Boston.
Mrs. N. W. C. GILSON, Boston.
Mrs. NELLIE SPRAGUE, Boston.
A. A. HATHAWAY, M. D., Boston.
Mr. DAVID NEVINS, Boston.
Mr. THOMAS WENTWORTH, Boston.
Mr. J. HARVEY YOUNG, Boston.
Rev. Dr. WARREN, D.D., Philadelphia, Pa.
Mr. EDWIN FAXON, Philadelphia, Pa.
Mr. GEORGE HALL, Philadelphia, Pa.
T. B. MCCLELLAND, Philadelphia, Pa.
HUGH MCLEAN, Philadelphia, Pa.
Mr. LONGSTRETH, Philadelphia, Pa.
Mrs. BELROSE, Philadelphia, Pa.
Mrs. BERRY, Philadelphia, Pa.
Mrs. SISSENGER, Philadelphia, Pa.
JOHN C. MORGAN, M. D., Philadelphia, Pa.
J. MACLEAN, M. D., Philadelphia, Pa.
L. A. SAUNDERS, M. D., Philadelphia, Pa.
Miss ANNE MCDOWELL, Philadelphia, Pa.
Mr. F. J. DREER, Philadelphia, Pa.
Capt. CHAS. GOUPTILL, Winter Harbor, Maine.
Prof. S. MORRIS, Ann Harbor, Mich.
H. PHILLIPS, Wheeling, W. Va.
Dr. SWAIN, Indianapolis, Ind.

Mr. ECKHART, Wheeling, W. Va.
JOHN BLESSLEY, Wheeling, W. Va.
JOHN BOYD, Wheeling, W. Va.
Mr. and Mrs. MICHAEL SWEENEY, Martinsville, Va.
CHAS. HEMPEL, M. D., Grand Rapids, Mich.
Dr. THOMAS KISSNER, Martinsville, Va.
General POWELL, St. Louis, Mo.
Dr. SENTRE, Columbus, O.
Mr. CALVIN CARR, Cleveland, O.
Prof. VON TAGEN, Chicago, Ill.
Rev. GEO. TUTTLE, Kalamazoo, Mich.
AGNES JOHNSON, M. D., Zanesville, O.
Mrs. DOUGLASS, Zanesville, O.
Mrs. BLACK, Zanesville, O.
Mrs. CHASE, Toledo, O.
Capt. COOMS, Prospect Harbor, Maine.
Mr. E. GOODMAN, Ed. Bapt. Standard, Chicago, Ill.
Mr. E. JUDSON, Ed. N. W. Lumberman, Chicago, Ill.
Mrs. HORACE WELLS, Van Wert, O.
Mr. and Mrs. J. W. BULL, Fort Wayne, Indiana.
Mr. DUMM, Editor Fort Wayne Democrat.
C. E. BATTERSON, Columbus, O.
C. H. HERSHHEIGER, Columbus, O.
Rev. Dr. MULLER, D. D., Buffalo, N. Y.
Col. H. S. GREENLEAF, Rochester, N. Y.
P. L. F. REYNOLDS, M. D., Albany, N. Y.
A. SHEPHERD, M. D., Glendale, O.
Mr. GEORGE TROWBRIDGE, Glendale, O.
W. G. HALL, M. D., St. Joseph, Mo.
Mr. L. SWETT, Chicago, Ill.
Mr. B. M. AUSTIN, Kalamazoo, Mich.
Hon. W. S. WILCOX, Adrian, Mich.,
and many others.

TESTIMONIALS.

TESTIMONIAL AND PRESENTATION BY LADIES OF BOSTON, MASS., JUNE 15, 1871.

THE undersigned ladies of Boston, prompted by gratitude, and a deep sense of human sympathy, desire to tender a public note of thanks to Prof. Elizabeth J. French at the close of her last course of private lectures and valuable conversations to ladies, in which she has with so much skill reached the understanding of her class, not only in the elimination of her specialty, electricity applied as a remedial and curative agency to the generic diseases of women, etc., but in elucidating the laws of physiology governing health, so that if her listeners improve her counsel they may ameliorate their sufferings, prolong their lives, and elevate their womanhood.

The result of years of study, the record of an extensive and successful practice, renders Prof. French's parlor lectures of invaluable interest to all not too prejudiced or bigoted to be enlightened. And we urge that one so proficient to instruct, and so conversant with a mode of treatment which commends itself on investigation to every thinking mind, should not be permitted to leave our city without being publicly presented to our community, especially to women. Her

cures are wonderful; any one of which should place her skill and efficiency beyond question. Many of the undersigned are cheerful witnesses that electricity as a therapeutic is not a "humbug" in the hands of this eminently superior lady; moreover, that it possesses subtle power to eradicate diseases which have baffled the skill of the most eminent physicians.

Many scoffers have come to her after all hope of recovery was extinguished, and have become her enthusiastic advocates after availing themselves of her scientific treatment, and being restored to health and happiness in a marvelously short space of time.

With the deep affection and respect which Prof. French so richly merits as a physician, a woman, and a benefactress, we feel it an honor to subscribe ourselves her friends, and present her this testimonial: *

Mrs. EDWIN FAXON,	Mrs. DAVID NEVINS,
" J. HARVEY YOUNG,	" JAMES ATHERTON,
" Dr. MAYO,	Miss H. A. MCWAIN,
" W. H. CILLEY,	Mrs. NETTIE N. WILDER,
" Dr. A. E. CUTTER,	" Dr. L. A. BUSTEAD,
" NELLIE SPRAGUE,	" J. C. PARKS,
Miss JENNIE COLLINS,	" A. A. BOYNTON,
Mrs. C. SEABURY,	" E. B. DUNBAR,
" L. S. EMERY,	" M. S. BETTISON,
" N. J. CROSBY,	" J. RICHARDSON,
" Dr. A. E. GILBERT,	" Dr. MINNIE BAKER,
" CAROLINE FOSTER,	" A. W. C. GILSON,
" H. C. LONG,	" S. W. JOHNSON,

and others.

* The testimonial spoken of was in the shape of an elegant set of silver service, with a handsome inscription, finely engraved.

Testimonial from Ladies in Ohio.

Mount Vernon, O., Aug. 18, 1870.

We, the undersigned ladies of Mount Vernon, Ohio, desire to express our thanks to Mrs. Prof. Elizabeth J. French in a more public manner than the vote of thanks we tendered her at the close of her valuable hygienic and physical culture lectures. We do herein offer to Mrs. Dr. French our most sincere and heartfelt thanks for the affectionate interest she has manifested in our physical well-being, for the relief from suffering afforded many, and for the important instructions imparted in her lectures, which were based upon purely moral and physiological principles. We desire to express our highest appreciation of her unfailing skill as a medical practitioner, and our utmost confidence in her ability to sustain the position which she takes.

We most cordially and earnestly invite Mrs. Prof. French to again visit this city at her earliest convenience, hoping the ladies of Mount Vernon will then have become acquainted with facts that stand out in bold relief before us, making evident the utility of her presence as it regards the use of electricity, and avail themselves of her truly scientific practice, which so naturally and freely meets the necessities of our sex.

Mrs. J. C. Sapp,	Mrs. J. H. Hampton,
" L. N. Norton,	" H. S. Porter,
" Albert Ellis,	" L. M. Mitchiel,
" M. S. Hyde,	" W. J. Morton,
" N. Boyton,	" E. Lane,
" M. L. Cohen.	" N. Tilton,

Mrs. E. McELROY,
" L. H. BENEDICT,
" S. W. LIPPITT,
" R. THOMPSON,
" J. M. RAWE,
" A. J. WIANT,
Miss LOUISA REEVES,
" ELLA COHEN,
" A. EVANS,
" M. HODGE,
" M. BEACH,
Mrs. S. BOWERS,
" J. C. SPENDLER,
" E. J. REESE,
" S. MARTIN,
" L. WARNER,
" M. R. NEIPRASCHK,
" J. RUSH,
Miss H. L. McKIBBEN,
" R. LIPPESK,
" L. BOWERS,
" L. GRAFF,
and others.

CASES OF CURE.

No. 1.

CURE OF AN OVARIAN TUMOR OF THIRTEEN YEARS' STANDING.

Case of Mrs. John C. Gay, of Prospect Harbor, Goulds-boro, Maine.

THE particulars of the following wonderful and interesting case of cure, under electrical treatment *scientifically* applied, were furnished by the patient who forms the subject of the narrative. The names of the various physicians who were consulted in this case, and who pronounced adverse opinions as to the possibility of cure except through a painful and hazardous surgical operation, are purposely withheld, as the publisher's desire is only to forward the interests of truth and science, and to bear faithful witness to the value of electrical therapeutics, without casting invidious reflections on the advocates of other schools of practice.

Mrs. John C. Gay was first treated medically for ovarian tumor in the year 1858, at which time the case presented a well-defined evidence of its nature. From that year up to 1866 the disease became more and more painfully developed, and, notwithstanding the advice of many well-skilled physicians in various districts.

the sufferer continued to grow worse and the symptoms to increase in dangerous and obstinate tendency.

In the fall of 1866, Mrs. Gay, acting under the advice of those physicians in her own State who felt themselves unable to afford her relief, went to Boston, where she submitted her case to several of the most eminent practitioners of the city. She was at length induced to become a patient of the City Hospital, and for three years of incessant suffering Mrs. Gay attended constantly to the treatment prescribed by the hospital faculty, but still without obtaining the long-sought-for alleviation of her dreadful complaint.

During this distressing period, Mrs. Gay became both an out- and in-door patient. She submitted to many examinations, and followed faithfully the various methods of treatment prescribed for her case. In consequence of the continual state of suffering and great mental anxiety which attended these long years of endurance, the general condition of the patient's health was so reduced that the hospital surgeons, who pronounced an operation the only available method of cure, declined to perform it until the tone of the system had been renovated by appropriate treatment.

During the various examinations to which Mrs. Gay was subjected, the statement that she was suffering from an ovarian tumor was constantly confirmed, and the opinion reiterated that a surgical operation would ultimately be the only method of removing it.

In March, 1867, Mrs. Gay returned to Maine, in the hope that her general health might receive benefit from the change. Failing in this expectation, she again returned to Boston, and once more entered herself as an

out-door patient of the City Hospital. It was after several additional months of fruitless medical treatment that one of the consulting surgeons of the institution frankly assured the patient that there remained for her no alternative but to submit to the much-dreaded operation or prepare for death. Mrs. Gay herself relates her interview with the doctor in question, in the following terms:

"Mrs. Gay," said her adviser, "it is useless to disguise the fact that we consider yours a very bad case, and whilst we may hope for a successful result from an operation, the risk of a fatal termination would be very great."

Mrs. Gay questioned this gentleman as to how many chances of success there might be in a case as bad as hers.

The doctor replied, "Not more than one in ten."

The patient adds:

"This one chance in ten I resolved not to hazard, and feeling that I had exhausted the best skill at my command, and that there was no more hope for me, in April, 1869, I returned to my home to await, as patiently as I could, the approach of death."

It was in July, 1871, that Dr. Elizabeth J. French, professor of electrical therapeutics, went to Winter Harbor, Maine, to attend an invalid with whom Mrs. Gay was acquainted. The success which resulted from Dr. French's treatment induced her patient to urge Mrs. Gay to consult her likewise. Rather to satisfy the entreaties of her husband than with any faith in a successful issue, Mrs. Gay at length consented to visit the professor. At that time the tumor had become so

large, and such a vast array of sympathetic evils had become developed in the unfortunate patient's system, that her appearance was as deplorable as her case seemed hopeless. The form was bent over toward one side, and the entire abdomen, especially about the region of the tumor, was so frightfully swollen and distorted that the sufferer moved with extreme difficulty, and could by no possibility assume an erect attitude.

Dr. French, without inquiring into the details of the case, diagnosed it by her usual method,—applying the battery to different points of the cranium; and after pronouncing the chief source of difficulty to be a large fibrous ovarian tumor, unhesitatingly declared her opinion that it could be entirely cured by the scientific application of electricity.

After thirteen years of incessant suffering and fruitless treatment, after exhausting, as the patient herself alleged, "the best medical skill which she could command," and, upon the highest authority she could consult, "having resigned herself to die," it is no wonder if Dr. French's opinion at first had but little weight. That she should have been pronounced *incurable* in years past, when her system was far more liable to recuperation, and curable at a period when, to use her own expression, she was "almost dead," seemed to the poor patient more like the utterance of presumptuous ignorance than skillful science. Deeming, however, that her miserable condition was not even susceptible of aggravation, and that no new experiments could add to the suffering she was then enduring, Mrs. Gay at last consented to receive one electrical treatment, the result of which encouraged her so highly that she

submitted to several succeeding treatments, and at the end of ten days from the time of her examination she found she was able to stand nearly straight, and the size of the abdomen was reduced quite eight inches in circumference.

After four weeks of treatment with Prof. French, Mrs. Gay affirms that the tumor had almost entirely disappeared, whilst her general health became so much improved that she was able to dispense with the doctor's attendance. Mrs. Gay then purchased a battery and continued to treat herself in the manner prescribed by Dr. French, and in the August of 1872 testified to the efficacy of the cure which had been wrought upon her, in the following words:

"I have at this time no sign of tumor. I am as well—able to work, walk, run, and perform my household duties—as I was twenty years ago, and I am engaged in applying the same great remedial agent to others as I have benefited from myself. I have now the great satisfaction of relieving many from suffering, and can truly say I thank God for electricity and Dr. French.

"MRS. J. C. GAY,

"PROSPECT HARBOR, GOULDSBORO, ME."

No. 2.

CURE OF SCROFULOUS SORE EYES, AND RESTORATION FROM PARTIAL AND OCCASIONAL TOTAL BLINDNESS, BY ELECTRICAL THERAPEUTICS.

Testimony of H. W. Phillips, Esq., of Wheeling, West Va., in the Case of his Child.

The following striking case illustrates most forcibly the value of electrical treatment scientifically applied, not only as a restorative under one of the worst calamities that can afflict the race, namely, loss of sight, but also proves how far such a method of practice becomes effective; in fact, the last resort of science, when all other curative means are at fault. As nothing can add to the convincing character of personal testimony in strange and unusual instances, we shall here subjoin the candid and straightforward statement of the party most nearly interested, namely, the father of the afflicted child. It must be premised that the gentleman whose testimony is thus cited was not only a stranger to Dr. Elizabeth J. French, but, in the commencement of his little girl's treatment by that lady, was prejudiced against her practice, and the child's examination in her initiatory visit was undertaken against his wishes; also, it should be remarked, that the little patient's condition was one of several years' standing, and that all attempts at alleviation by the regular faculty had been sought in many places, and through many systems of medical practice, in vain.

Extracts from a Letter, dated Wheeling, January 7, 1870.

"Our child, when first treated by Dr. Elizabeth J. French last fall, had scrofulous sore eyes, and at times was totally blind. She had been under the care of some of the most eminent physicians, and they had been unable to cure her after a trial of three years. For several months previous to her treatment by Dr. French, she had been totally blind. Even under the first manipulation at the doctor's hands, the little sufferer was enabled to dispense with her bandage, and enjoyed a partial return of her eyesight." Mr. Phillips continues: "In a short time she had her eyes opened, with all the inflammation removed; and in about a month's time she was entirely cured. Ever since then she has been able to bear her eyes exposed to the light, which before she could not endure. For several months previous to Dr. French's treatment, she had not only been deprived of sight, but was obliged to be shut up in a dark room with her eyes constantly bandaged. I have no hesitation in saying that if we had not applied to Dr. French, and used her electrical treatment, our child would now be blind."

Mrs. Phillips, the little girl's mother, who had also been a great sufferer for many years, and sought relief from many physicians in vain, at length became a patient of Dr. French's; and in reference to the results of her treatment, her husband writes thus in the concluding part of the letter quoted above:

"Mrs. Phillips was also under Dr. French's treatment for a combination of diseases, and was very much benefited by her; but, as some of her diffi-

culties were of long standing, Dr. French advised her to purchase a battery and continue its use. Mrs. Phillips still perseveres in the treatment prescribed and directed by Dr. French, and improves so manifestly, that I am in hopes she will be entirely restored. Dr. French whilst here cured a number of other persons of different complaints, to my certain knowledge.

"Respectfully yours,

"H. W. PHILLIPS.

"WHEELING, WEST VA., January 7, 1870."

In 1872, two years later than the date of the above letter, Dr. French revisited Wheeling, and found the little girl's eyes still continued well; in fact, permanently restored to their normal condition.

No. 3.

CASE OF COMPLICATED UTERINE DIFFICULTIES, AND INTERNAL INJURIES OF EIGHTEEN YEARS' STANDING, CURED BY ELECTRICAL TREATMENT.

If the claims set forth in this volume, for the superior efficacy of electricity over all other known curative agents, may appear liable to doubt, or susceptible of denial, the reader is referred to the details of the following highly important and interesting cases, the perusal of which cannot fail to command attention even from the most skeptical.

Although, for obvious reasons, the name of the lady whose case is herewith detailed cannot be published, the list of respectable referees attached to this work must

prove a sufficient guarantee for the strict authenticity of every statement it contains.

Mrs.——, formerly of Massachusetts, was endowed with an exceedingly fragile temperament even from her earliest youth.

Being developed into premature womanhood at the age of twelve years, her own description of the sufferings she subsequently endured in the form of female weaknesses, renders it likely that some years antecedent to her marriage she was afflicted with falling of the womb.

The lack of physiological knowledge, so ignorantly withheld in the education of our young women, rendered the sufferer unaware of her condition, and probably tended to confirm it into a chronic malady.

About the age of twenty-four the young lady became the wife of Mr. ——, and shortly afterwards miscarried after only a few weeks' pregnancy.

From the effects of this sickness Mrs. —— did not recover for several months, and when she again gave promise of becoming a mother, her sufferings during the whole period of gestation were most acute and continuous.

During the five months before the birth of her child Mrs. —— was unable to rise from her bed, dress herself, or undertake the slightest amount of exertion.

Early in the eighth month of pregnancy the suffering lady gave birth to a child, after some thirty-six hours of severe and unmitigated labor-pains. The delivery was what is commonly called a cross-birth, only effected at last by instruments, and the attending physician declared, the fact that the lives of mother

and child were both preserved under these adverse circumstances was little short of a miracle. It has subsequently been stated by the patient herself that no bandages or compressions were applied to reunite the parts torn, lacerated, and unnaturally distended by the distressing conditions of such a delivery; and that during the months of intense agony that succeeded, the foundations were laid, from which arose a complication of disorders, which became chronic, in the regions of the uterus, bladder, liver, all the abdominal organs, and, by sympathy, in the action of the heart and respiratory organs.

For eighteen years Mrs. —— was a constant and acute sufferer, whether from the effects of organic disabilities peculiar to her system, whether from the want of proper medical treatment immediately after the birth of her child, or a combination of both circumstances, we do not presume to say. Suffice it that after eighteen years from the period of delivery the uterine passage was still unclosed, and the laceration and exposure of the maternal organs presented an appearance that might well have resulted from a delivery of only a few hours.

In the mean time the unfortunate lady had become the patient successively of several of the most eminent physicians of Massachusetts, and the expenses attending the various experiments practiced upon her during her eighteen years of incessant martyrdom amounted, as we have her husband's warrant for asserting, to several thousands of dollars. For the last five years of this most painful experience, Mrs. —— was wholly confined to her bed. Every part of her organism was afflicted in sympathy with the main source of suffering. Utter

prostration, agonizing pains in every organ, disease in almost every shape, seemed so entirely to possess the frame, that the chief miracle of the whole narrative is, that the vital forces could have been sustained at all under such afflicting conditions.

In 1871, after eighteen years' experience of the above character, Mrs. ——, yielding to the advice of a friend, consented to receive a visit from Dr. French, then entirely unknown to her, and submit to an examination by the doctor's method of electrical diagnosis.

In addition to several organic difficulties, arising in part from functional obstructions and nervous sympathy, Dr. French found in the case of Mrs. —— a well-defined condition of prolapsus uteri,—the body of the uterus being enlarged to about six times the ordinary size, and the os distended either way to an enormous extent. There was a considerable enlargement and advanced condition of fibrous tumor in the left ovary; considerable inflammation of the bladder and kidneys; general disarrangement of the digestive organs; highly inflamed condition of the liver and spleen; a considerable enlargement of the heart, and consequent distress in the respiratory organs. There were three large encephaloid tumors about the neck, and the whole body was swelled to enormous proportions.

Dr. French made a diagnosis of this complicated case on the 10th of March, 1871. The patient was then lying propped up in that bed to which she had been imprisoned for upwards of five years. Dr. French concluded her examination by unhesitatingly declaring that she could put Mrs. —— on her feet in less than three months.

Dr. French's first electrical treatment was applied in this case on the 12th of March, and continued steadily every day for seven weeks, at the expiration of which time Mrs. —— was so far recovered that she traveled six miles to the city where Dr. French resided, to receive her treatment nearer the doctor's residence. On the 26th of May, about ten weeks from the commencement of Dr. French's treatment, the patient undertook the journey from Boston, Mass., to Atlanta, Ga.,— and not only performed it with ease and comfort to herself, but her general health became benefited by the change. The patient subsequently purchased a battery, and in her absence from Dr. French, continued to use it as directed.

These treatments, together with an occasional application of electricity from the doctor, have completely destroyed the tumorous condition of the ovary, restored the uterus to its usual size, and reduced the induration. The accompanying symptoms of acute suffering and local distress in all the other organs have disappeared; the abdomen has become reduced at least twenty inches in circumference. The encephaloid tumors are reduced from a size which would have filled a half-pint measure to mere kernel-like indurations; and now, in February 1872, the patient performs all her usual household avocations, walks, travels, and enjoys as fair a share of health as any lady with a naturally delicate organism could be expected to do; and although continued treatments are still deemed necessary to rebuild the organs that have been for so many years abused by experimental practices and their vitality sapped by disease, the lady herself passes among

her acquaintance and friends as one restored from the dead, and one of the most forcible living illustrations that the world can produce of the efficacy of electrical therapeutics scientifically applied as the last best resort of those afflicted by disease.

No. 4.

MALIGNANT PUSTULE.

"This disease, fortunately, is of rare occurrence, since, in a large majority of cases, it terminates fatally in from twenty-four to thirty-six hours. The origin or cause of the disease is not well defined or understood. The French physicians, who term it *pustule maligne*, had for a time the theory that it resulted from the bite of a fly that had recently been feeding upon decomposed animal matter, since its action upon the system so much resembled the poison communicated sometimes to medical students in the dissecting-room from the cut or scratch of a knife. This theory was abandoned, however, when a case occurred where it was known that by no possibility could a fly or flies have approached the patient. All agree, however, in pronouncing it a most virulent poison, soon entering the circulation and terminating in death, unless arrested in its first stages. It comes in the form of a small watery pimple, exceedingly painful from almost the first moment,—generally about the face,—near the nose or on the lips,—but sometimes on other portions of the body.

"In the autumn of 1859, about ten o'clock one night, I felt a painful, pricking sensation in the middle finger of the right hand, near the nail. I had been engaged during the evening in some work, when I might have driven a splinter into my finger, and, supposing I had done so, took out my knife to remove it. I found only a small watery pimple, from which, upon pricking and squeezing, a single drop of greenish water exuded. My greatest surprise was in the exceeding painfulness of so apparently small a matter; but not dreaming there was any especial danger to be apprehended, I wrapped around it a cloth saturated in a simple liniment, and went to bed.

"In the morning it was very painful,—the finger swollen and stiff, and the pimple or spot—about the size of a large pin-head—of a purple color. I applied a poultice, and took no further notice of it until about three o'clock in the afternoon, when my attention was arrested by a strange, burning sensation running up my arm in regular pulsations, and flashing to the heart, followed immediately by a chill. The sensation was so strange and painful that I felt, instinctively, danger approaching in some form. I went immediately to Dr. French, No. 8 Fourth Avenue, New York. She seemed at once to apprehend the case, and ordered an electric vapor-bath prepared instantly. I had been seated perhaps three minutes when told my bath was ready. I rose to go to it, took one or two steps, and fell fainting to the floor; was told afterwards that I had a hard fit, with frothing at the mouth. I am told I was unconscious some ten minutes. I then, with assistance, reached the bath, and had a strong current

of electricity applied down the arm. I remained in the bath some fifteen minutes, and although the temperature was much higher than I have ever taken it before or since, viz., 140° Fahrenheit, I was chilly. While I was in the bath, an eminent physician and personal friend was sent for. He arrived soon after I came out of the bath, and while reclining upon a lounge and having electricity applied, he unhesitatingly pronounced it malignant pustule, and commenced cauterizing the sore with nitrate of silver as a counteracting poison. Dr. French had prepared poultices of bran and vinegar, and during the evening and through the night electricity was almost constantly applied, with poultices frequently changed and applied quite hot, with occasional cauterizations. During the night I was partially insane. Early next morning the physician alluded to brought with him an old and eminent practitioner. This physician saw no hope, and felt that further effort was useless. My friend—the first physician—then advised Dr. French to telegraph at once to my brother, who was out of the city, that I could not live many hours. Mrs. French replied, 'No, doctor, he will not die. Electricity will save him.'

"During this entire day and until near midnight, although the applications of electricity were almost incessant, no positive evidence of a change occurred. About this time, however, the rigidity of the muscles began to relax; the color of the skin changed and assumed a more life-like hue. I grew warm, and soon, under the influence of electricity, a profuse perspiration broke out, and by morning I was pronounced out

of danger by the physicians who had given me up the day before. It was many days, however, before the poison was entirely expelled from the system and I was fully restored to health and strength.

"About the time of my attack two cases occurred,—one in the city of New York and one in Brooklyn; and both terminated fatally, although treated by unquestionable medical skill. I have no hesitation, therefore, in asserting, as my positive conviction, that I owe my escape from death with this terrible disease to the scientific applications of electricity by Dr. Elizabeth J. French.

"T. CULBERTSON.

"PHILADELPHIA, March 17, 1873."

No. 5.

From the Fort Wayne, Indiana, Democrat.

SUN-STROKE.

"Mrs. Professor French has met with no inconsiderable success in her treatment of diseases by electricity. We are handed the following, and can say in regard to it, that we know the subscriber to be an actual resident of this city, and a man that could not be influenced by love or money to make a statement other than the truth. (*Editor 'Fort Wayne Democrat.'*)

"I have been suffering intensely from a partial sun-stroke, received some two years ago in Cincinnati, O., and have applied to many physicians for relief without avail. I commenced treatment with Mrs. Professor

French, May 17, 1870, and after three electric applications felt great relief, and am now (May 27) almost entirely free from pain. I know that my case, pronounced by some of our best physicians *incurable*, has been greatly benefited, and I feel that this doctor has done me more good in this short time than all the rest put together for the last two years.

"A. J. PICKINS,
"*Fort Wayne, Indiana.*"

No. 6.

RHEUMATISM, RESULTING IN SEVERE MUSCULAR CONTRACTION OF THE LOWER LIMBS.

James Gordman, Canada West, had been a martyr to rheumatism almost from childhood, and for eleven years the muscles of his lower limbs were so contracted and drawn that his heels rested upon his hips. He had spent four years in the hospitals of Paris, and three years in an English hospital, and was discharged as *incurable*. In 1852, in his thirty-second year, he was brought to me in New York City. In his case I used the vapor-bath in connection with electricity, treating him every day,—one day electricity without the bath, and on alternate days electricity in connection with the bath; and I will here add that the electric vapor-bath, properly administered, is most valuable in most cases, and in some almost indispensable. In five weeks Mr. Gordman was so far restored that he could walk quite well with the simple aid of a cane

only; was free from pain, and his general health quite toned up. Through me he obtained a battery (not nearly so effective as the present improved Kidder battery, but the best then in use), returned to Canada, followed up the electric treatment in accordance with written instructions from me, and has not only entirely recovered, but has himself treated, cured, or relieved many others.

E. J. FRENCH.

No. 7.

TESTIMONY OF MRS. EMMA HARDINGE BRITTEN, THE CELEBRATED LECTURER, ON THE CURE OF A THROAT DISEASE AND THE RECOVERY OF HER VOICE.

[From the "Philadelphia Press" of March 7, 1873.]

"PHILADELPHIA, March 7, 1873.

"TO THE EDITOR OF THE 'PRESS':

"SIR,—Although a foreigner in your country, and only a temporary sojourner in this city, I am sufficiently acquainted with its journalistic literature to appreciate the broad and catholic tone of 'The Press' in relation to all the mooted questions of the day. Believing that the editor of such a journal will accept of such suggestions as tend to the evolution of new ideas, uninfluenced by crafts, cliques, parties, or sects, I earnestly solicit the use of your columns in calling the attention of large-hearted and large-brained members of the medical faculty to a phase of electrical science calculated to unravel a profound problem, and present an invaluable contribution to the realms of therapeutic art. If I understand aright the position of medical

men, the chief obstacle to their success in ameliorating the sufferings of the race are, first, the lack of a more exact method in diagnosing disease than a reliance on the superficial signs afforded by symptoms. Next, they fail to arrive at any specific method by which they can deal directly with the causes rather than the effects of physical disturbances. For many years past I have been interested in observing the efforts of the more progressive members of the medical faculty in England, France, Germany, and America to place therapeutic science on the basis of reliable principles, both in the diagnosis and treatment of disease.

"I know it is the popular belief that medical practitioners desire to veil their art behind the mask of lingual mystery, besides acting in sundry other ways more calculated to extend the sphere of their practice than the circle of their knowledge; but, on the other hand, I know that there are many noble and progressive minds in the medical ranks who have been long and faithfully seeking to convert probabilities into certainties, and symptomatic indications into infallible diagnoses.

"Among these progressionists I have noticed that medical electricity has found much favor, and that many of the most eminent men in the profession recognize it as a valuable adjunct in their practice. I presume there are many who have thus realized the value of electricity in special cases, but who have felt baffled by its uncertainty of action in others.

"I know that strenuous efforts have been made to discover such varying currents of electricity as would produce different results on different conditions of disease; and I also know how much the value of elec-

tricity as a remedial agent has been lessened by the unscrupulous practices of the ignorant and the haphazard application of the battery to all manner of diseases by unscientific charlatans. As I have myself 'suffered many things at the hands of the physicians,' and submitted to be experimented upon by French, German, and English electricians, until the greatest marvel of their unscientific practice is that I am now alive to protest against it, so I respectfully submit that I have some right to be heard when I affirm that this beautiful Quaker City contains within its limits the long-sought-for solution to the problem of medical electrical science, and that here, in this great emporium of therapeutic art, resides a comparatively unknown practitioner, who, after twenty-five years of patient study and constant experience in the application of electricity as a remedial agent, has discovered the laws which make its application a mathematical certainty, whether in the diagnosis or treatment of disease. One of the specialties of this lady's discovery is her remarkable power to find 'all the diseases to which flesh is heir' mapped out on the brain, so that by the application of electricity to the cranium she describes the condition of the organism with unfailing precision. Her methods of treatment also are based upon the adaptation of different currents to different tissues, organs, and diseases, and, as far as I have been able to observe, every disease that is curable can by this method be conquered. The fact that this lady can teach her method to her pupils, in the form of a regular system, is a proof that her claims are susceptible of demonstration, and based upon the procedures of fundamental principles.

"As the remarkable phase of therapeutics to which I am calling attention involves the possibility of revolutionizing the whole realm of science in that direction, I will ask permission to add an item of personal experience which may serve to illustrate the working of the system, and define the ground upon which I ask credit for my statements.

"Some twenty years ago, whilst studying singing at the Royal Academies of Music in London, Paris, and Milan, my throat became seriously affected, and I was compelled to relinquish my profession as a vocalist. At the Royal Haymarket Theatre, London, where I subsequently became a performer, I still found my voice injured by the complaint with which I suffered. As one of 'Her Majesty's servants,' I was entitled to attendance from Mr. Liston, Sir Benjamin Brodie, and other medical men eminent in their profession, to whom my case became a subject of interest.

"After a succession of painful surgical operations, none of which were effectual in restoring my voice, I was advised, as the only means of checking the progress of rapid pulmonary consumption, to take a long sea voyage. Realizing the hopelessness of my case, and the objection my medical attendants must feel to see a well-known *artiste* die under their hands, I followed this advice, and made a voyage to America. Shortly after my arrival in New York, I attempted to resume my profession by giving public readings; but the difficulties in my throat, although temporarily modified by my voyage, returned with such force that my physician, Dr. A. D. Wilson, of New York, decided that any continuance of vocal efforts might terminate fatally

in a few weeks. It was at this juncture that I was advised to consult an electric physician. Being imbued with strong prejudices against electricians in general, and female doctors in particular, I followed the advice tendered me with great reluctance, and anything but a predisposition in its favor. Before my examination was ended, however, my unreasonable prejudices were entirely removed. The lady I visited not only diagnosed my case with marvelous precision, but promised me a cure.

"In one month after the prediction of my early death and burial, my throat was sufficiently restored by electric treatment to enable me to undertake long and arduous representations at the Broadway Theatre, and within three months from the time of my first treatment, I commenced my career as a public lecturer, in which capacity I have continued for the last sixteen years, speaking, on an average, five times a week, and filling your own Academy of Music, and many of the largest halls in the States, without the slightest fatigue or inconvenience.

"I would not be guilty of thus egotistically citing my own experiences, did not my public position enable me to refer to great numbers of well-known persons, both in Europe and America, in verification of my statements. My professional career in London and Paris seemed to stereotype the circumstances of my case upon the minds of many eminent medical men, so that, when I returned to London some six years since, and exhibited my recovered powers of voice in public addresses to several thousands of people, expressions of astonishment greeted me from all who

remembered me, and had reason to believe those powers had been sacrificed to unsuccessful surgical operations.

"In my own person, then, sir, I am an illustration of the beneficial effects of electricity scientifically applied, and when others complain that they have failed to improve,—and some even affirm that they have suffered injury from its use,—could I feel justified if, from any feeling of personal reticence, I withheld from the community the knowledge that the clue was found which would make the application of this force as certain as the working of the Atlantic cable, and its action as reliable as the theorems of mathematics?

"Having devoted much time to the study of medicine myself, I have frequently been urged by my teachers to devote myself wholly to its practice; but, like Hahnemann, I have 'felt despair at the total lack of any reliable system of diagnosing disease,' and so little faith in any modes of treatment which paltered with the effects, rather than the causes of physical disturbances, that, like that great philosopher, I should infallibly 'have deemed it my duty to put on mourning for every patient who might die under my hands.' It was with these views that I, last summer, attended some classes in Boston, where I found the lady to whom I owed the recovery of my voice reading off, with unvarying accuracy, the physical disturbances in her patients' systems by *cranial* applications of electricity, and through the same force producing cures which were truly marvelous. At first I was disposed to attribute these unusual powers to certain superterres-

trial sources with which I am myself very familiar, but on this point the lady soon convinced me of my error. She not only claimed, but absolutely demonstrated, to me the fact, that her methods are based upon purely scientific principles and electrical laws which she has discovered in twenty-five years of deep research and patient experiment. She showed me that different currents can be evolved from carefully-constructed batteries, and adapted, with invariable results, to different characters of disease.

"Some of this lady's methods I have myself studied and verified. I have examined the improvements suggested by her in the mechanism of the batteries she uses; proved the variety of the currents she claims, and watched the success of their action upon different organs and tissues. I have learned from her the law by which we can discover all the conditions of the organism, whether in health or disease, mapped out upon the brain, and though it may take a lifetime to arrive at the skill and precision achieved by the discoverer of the system herself, I have seen enough to assure me she has opened up a new path in electrical and anthropological science, the end of which must conduct us into fields of grand and untrodden discovery.

"I have already trespassed too long upon your columns, Mr. Editor, whilst dilating on the interesting experiments in which I have been a favored participant; but I have felt it incumbent on me to make some effort to bring these profound indications of progress in medical science before the community, and I know of no method so effective as to lay them before

your numerous readers, and appeal to your generous and candid spirit of journalism to enable me to do so.

"I am not now acting under the authority of the lady, Mrs. E. J. French, whose discoveries I record through your columns, nor do I know how far she would care to subject her well-proven facts to the denunciation of speculative philosophy or bigoted professors of rival systems.

"I presume she has not forgotten, and would not choose to repeat, the experiences of the magnetizers before the French Academy of Sciences some three-quarters of a century ago; but I know Mrs. French courts investigation, and is earnestly engaged in teaching her methods to such pupils as she deems capable of appreciating its scientific principles. I may venture, therefore, to say that I shall be happy and willing, so long as I remain in the city, to communicate with earnest and candid persons desirous of further information on this subject, and for that purpose I subjoin my address.

"Trusting that even in this brief notice of my momentous subject I may succeed in awakening the interest of the truly scientific, especially of such as desire to evolve more light upon the science of medical electricity,

"I am, sir, very faithfully yours,

"EMMA HARDINGE BRITTEN."

No. 8.

A TERRIBLE CASE OF SPASMS AND SUFFERING, RESULTING FROM AN ACCIDENT AND MALPRACTICE.

Mrs. B——, of Wheeling, West Virginia, married seventeen years, had a fall and miscarriage in the first year of her marriage, was improperly treated, and from that time on was a fearful sufferer. From five to seven days in every month her pains were intolerable; she would have frequent spasms or fits, sometimes as many as six in a day. At times she was partially insane, and it would require several persons to hold her in bed. During several years she was under the care of a number of physicians, took quantities of morphine and other sedatives without any real benefit. In the autumn of 1869 Prof. French was in Wheeling on a professional visit. Some of Mrs. B——'s friends prevailed upon her to consult Dr. French. She commenced electric treatment just after one of her periodical attacks, and, almost impossible as it may seem, she never had another. Electricity seemed indeed a panacea in her case. Her pains soon ceased; she became regular; her general health and strength came rapidly; from a constant gloom and depression of spirits, she became cheerful and hopeful, and in a very short time was restored to perfect health. Within a year from the time she commenced treating with Dr. French, she presented her husband with a fine, healthy daughter, which they have named Elizabeth in gratitude to Dr. French. And now, three years having passed, she remains in the enjoyment of excellent health, and is again a mother, this time of a

splendid boy. Dr. French is at liberty to give the full name and address of this lady to any one honestly desiring information.

No. 9.

SEVERE CASE OF FISTULA.

Mrs. ——, of Wheeling, West Virginia, had been suffering for years with hemorrhoids, and finally fistula. No treatment seemed to benefit her. She was advised repeatedly to have a surgical operation; but as she had had two relatives operated upon and both had died from the effects, she feared to take the risk. In 1870 she was treated electrically by Prof. French, became in four weeks entirely cured, and has remained so ever since. She will cheerfully give her testimony when called upon, but does not wish her name used publicly.

Nos. 10–15.

Dr. T. J. Kisner, now of Bucyrus, Ohio, wrote to Mr. D. T. Hebert, of Wheeling, inquiring about Mrs. Prof. French's success as an electrician in that city. From the letter of Mr. Hebert in reply to Dr. Kisner we are permitted to make extracts:

"I believe Mrs. French to be thoroughly conversant with electricity in its remedial or medicinal forms. My judgment is based upon stubborn facts, in the form of *cures* which have come under my own observation, and of which I have been informed by parties entirely reliable.

"Mrs. ——'s child was taken very ill with scarlatina; two physicians were called, but their medicines failed to produce the desired effect (sleep). The child grew rapidly worse, tossing about continually, and finally, after many hours, when the mother lost all hope and the child seemed to be dying, Mrs. French was called secretly (as the doctors previously refused to consult with her). After, or I believe whilst she was treating the child, it dozed, and in an hour or so slept, and slept soundly until the next morning. The doctors marveled greatly in calling late at night and finding the child sleeping; they continued to prescribe, however, but their medicines were never given to the child. From the moment Mrs. French first treated it, the child was under her care until it entirely recovered.

"Mrs. ——, married nineteen years, without any children, was treated electrically by Mrs. French, and is now closely approaching her full time, so I am informed by a gentleman who is intimate with her husband.

"General W. H. Powell, of Kansas City (my uncle), badly bruised the muscles and ligaments in the sacro-lumbar and femoral regions; was treated for a number of months with little if any benefit, and finally visited Wheeling, and was treated seven or eight days by Mrs. French. When he arrived he walked carefully on two crutches; last week he walked the streets of Pittsburg all day with a cane, and still continues to improve."

Other names and cases are given in this letter, and the writer closes by saying, "I could give you many more, did time and space admit;" and adds, "I have perfect confidence in Mrs. French's ability to treat electrically any disease that flesh is heir to."

BOSTON, MASS.,
October, 1872.

"MY DEAR MRS. FRENCH,—As you are about to publish a work on the medical uses of electricity, I feel it my duty to add my testimony to the wonderful effects of electricity in my own case, and in other cases that came under my own observation.

"In the spring of 1870 I began to have an abdominal swelling, accompanied by much pain, which soon resulted in such general prostration that after a few months I was confined most of the time to my bed. Physicians whom I consulted pronounced me *enceinte;* and when I met you in the autumn I was supposed by physicians to be in my sixth or seventh month. You made a diagnosis, and pronounced it unhesitatingly an ovarian tumor, and that in a few weeks you could entirely remove it by electricity alone. I commenced treating with you at once. In ten days I was reduced in size by abdominal belt eight inches. At the end of seven weeks the tumor was entirely removed, and I was restored to fine health, and have remained so ever since. During my daily visits to your rooms I saw, and became acquainted with, many ladies who were being treated for various diseases, and all being benefited. After I was cured I studied your system with you, and remained as your assistant some months. Since then I have been practicing electrically under your system, and have made a great many cures of tumors, cancers, paralyses, rheumatisms, female weaknesses, etc., and will cheerfully give any information in my power, and refer to parties in Boston, who have been under my treatment,

and who are living witnesses to the efficacy of electricity properly applied.

"MRS. M. J. BAKER."

BOSTON, MASS., November 5, 1872.

This is to certify that in the spring of 1871 I was, after long and intense suffering, rapidly losing the use of my left arm and side, and must very soon have become wholly unfitted for business. I had tried various remedies without relief, and had almost given up all hope, when my wife became a patient of Mrs. Prof. E. J. French. Seeing the benefit my wife was receiving, and hearing of other wonderful cures made by Mrs. French, I decided to go see her myself. The result of this interview was to place myself under her treatment. In less than three weeks my arm and side were very much improved, so much so that I purchased a battery through Mrs. French, and by her instructions continued to treat myself, occasionally visiting her, and in six months I was wholly cured, so that I now can say *I am well;* and I can recommend her mode of treatment, electricity, as being, together with her skill, the best thing in practice for any and all afflicted in like manner.

C. SEABURY,

49 *Hanover Street, Boston.*

I suffered for four years from retroversion of the uterus, and, a good portion of the time, painful ulceration, restricted menstruation, occasioning much pain, inflammation of the bladder, etc. I placed myself under Mrs. Prof. French's electrical medical treatment in September, 1870. In three treatments I was entirely relieved of retroversion, and in ten treatments all other difficulties were removed, and I was restored to more perfect health than I had enjoyed for many years previously. These treatments caused no pain or exposure.

MRS. J. H. C.,
Toledo, Ohio.

No. 16.

CASE OF FIBROUS TUMOR IN CONNECTION WITH CHILD-BEARING.

Mrs. H——, a lady afflicted with a fibroid ovarian tumor, became the mother of a child, at whose birth she suffered so intensely that one of the best surgeons in Philadelphia and her family physician declared she could never again become a mother without serious danger to life. Finding herself *enceinte*, however, three years later, and the tumor becoming more and more painful, at my recommendation Mrs. H—— determined to try electrical treatment for its removal.

Previous to commencing this course of treatment her case was diagnosed by Prof. Elizabeth J. French, who found a fibroid and highly indurated tumor originating on the ovary, and extending along the broad

ligament of the uterus. The uterus also was much enlarged,—five times its normal size,—and all the adjacent parts were sympathetically affected.

Mrs. H—— commenced electrical treatments and electric vapor-baths under my care in the third month of her pregnancy.

She continued to improve rapidly from this time, and after completing her full term of nine months, in January of this year, 1873, she gave birth to a fine, healthy child, without any extraordinary pain or inconvenience. At that time the tumor was not entirely removed, but it had greatly diminished in size, occasioned her none of the former distressing symptoms; and at the present date (some four months since the birth of her child) the patient continues well and strong.

Any further information that may be desired on this subject I shall be happy to communicate.

ELIZA J. BURNSIDE, M.D.,
Philadelphia, Pa.

REMOVAL OF A UTERINE POLYPUS IN TWO TREATMENTS BY ELECTRICITY.

The following remarkable cure and rapid removal of a uterine polypus occurred in the practice of Dr. E. J. Burnside, pupil of Prof. French in Electricity:

April 5, 1873, Mrs. D——, of Hestonville, called on Dr. Burnside, to consult her about her condition, which, at that time, was one of extreme suffering. In

the month of January previous, Mrs. D—— had experienced a miscarriage, after three months' pregnancy. The fœtus—now in possession of Dr. Burnside—shows striking evidence of the presence and pressure of the polypus, one side of the head being considerably flattened, and the upper extremity on the same side being pressed in and in part consumed. The polypus was attached to the fundus, and hung down to the os. It measured two inches in diameter, and the hemorrhages that poured from it were profuse and terribly debilitating to the patient.

Dr. Burnside treated this case twice, and on the second occasion the polypus came away without the slightest inconvenience or force. The discharges from that time ceased; the patient's health rapidly improved; she resumed her usual occupations and exercises, and appeared to her family physician and the friends who had been accustomed to witness her debilitated and suffering condition, like one suddenly restored from the grave.

Any further information that may be desired on this subject will be cheerfully given by

DR. E. J. BURNSIDE,
Philadelphia, Pa.

"76 HUDSON AVE., ALBANY, N. Y.,
"May 17, 1877.

"MY DEAR DR. FRENCH: One year ago to-day I received my first treatment in electricity at your hands. *Then*, almost a hopeless invalid, I could not lie nor turn in bed, nor could I sleep after four o'clock in the morning. Skillful physicians failed to diagnose

my case correctly. The 'cranial diagnosis' in your hands showed the locality, nature and extent of lesion under which I was suffering, and pointed unerringly to the treatment which was ultimately to be the means of restoring me to perfect health. At this writing I consider my restoration complete and, as far as I can now see, permanent.

"My confidence in the therapeutic power of electricity is growing more and more as I come to learn its wonderful effect upon organic derangements and pathological conditions. Of all the systems of electric therapeutics now taught, I like yours the best. It is more comprehensive. It controls a larger number of cases. It is less dangerous in its application. It is the only system that pretends to *correct* or *restore displacements*—a very great improvement upon all other teachings. While treating myself during the past year I have used it in my general practice. I have been more than successful in most cases. I have corrected a left version of the uterus of three years' standing, which had produced paralysis, both sensory and motor, of the corresponding side, and had been pronounced *incurable* by many distinguished physicians. I have arrested the growth of uterine and ovarian tumors and absorbed others entirely. I have several cases of paralysis now under treatment, and all are doing well. Time and space will not permit me to name all the good results I know of your system of electro-therapeutics. You are engaged in a great and noble work, and I trust your life may be long spared to carry on this good work, and make others see and understand the great value of your sys-

tem in carrying help to those who are suffering without hope.

"Yours, very truly,
"P. L. F. REYNOLDS, M. D."

"GLENDALE, O., May 1, 1877.

"DR. ELIZABETH J. FRENCH: I deem it a duty and, withal, a pleasure, to testify to the correct delineation of the cause of my physical decline in health and vigor through your method of electro-cranial diagnosis, and subsequent successful treatment through electropathy as prescribed by you. My case had baffled the skill of several physicians of high repute, and in trying the best and varied climates in the United States, extending through a period of three and a half years, I had found no relief. Now, after a lapse of seven months under steady treatment as per your directions, I find myself so much strengthened and invigorated as to certainly assure me, in proper course of time, full health and strength will again be restored, notwithstanding the primary cause which produced my weakness dates back some fifteen years, and a slow but steady giving way of the vital powers had been going on from that period up to the time you took my case in hand.

"With much gratitude and esteem, I am
"Yours, most truly and sincerely,
"GEO. W. TROWBRIDGE."

CURVATURE OF THE SPINE AND PARALYSIS.

"GANO, Butler co., O.
"May 10, 1877.

"This is to certify that my son Clifford, a boy a little over three years old, was paralyzed in one leg and had curvature of the spine from an attack of spinal meningitis when he was two years and six months old, which rendered him unable to either stand on the limb or raise the foot from the floor. The limb had become smaller than the other, and was constantly cold, with very poor circulation. The other limb was also much colder and weaker than natural. In this condition I put him under the electrical treatment of Dr. Elizabeth J. French, and within one month the child was able to raise the foot, and move it much more than at any time since his attack of sickness. From that time on until the present there has been a gradual improvement, so that now he can walk by supporting his hands on a table or something to keep the body steady. This gives me great encouragement that in a reasonable length of time he will be enabled to use his limbs without any assistance and have good use of his body, as the curvature of the spine has been entirely removed since he has been under treatment, which is now three months.

"H. SULLIVAN."

ADDITIONAL CASES.

SEVERE CASE OF SPINAL AND HIP DISEASE.

In January, 1873, George Saylor, a boy then about eleven years of age, was brought to Mrs. French for treatment. He was suffering from a severe curvature of the spine, together with an enormous enlargement of the sternùm, and also from hip disease. The child presented a most pitiful appearance, the vertebral column in the dorsal region as well as the breast being frightfully curved outward. The leg on the affected side was constantly cold and numb, was shrunken, and was two and a half inches shorter than the other leg, and was moved with difficulty and pain. For several years this suffering child had only been able to ascend the stairs by placing his hands upon his knees and partly lifting this foot, and the act of walking was performed with exceeding pain and effort. The boy's deformity had been caused by a fall, and from the age of two years he had been subjected to many kinds of medical treatment, without receiving any benefit. He was treated twice a week in Mrs. French's electro-clinic rooms up to about the first of April, and during April and May two and three times a week at Mrs.

French's house, where the injured leg had become well and strong, the enlargement of the spine and sternum had nearly disappeared, could walk and run up and down stairs with perfect ease, could eat well, sleep well, and was rapidly growing straight and tall. His mother, Mrs. R. Saylor, corner Broad and Arch streets, Philadelphia, reports him now—April, 1875—as perfectly well, rugged and strong, and will cheerfully give any information in her power relative to her son's case, and to several other cases of which she has had personal knowledge.

A SEVERE, ALMOST HOPELESS CASE OF DYSPEPSIA, SLEEPLESSNESS AND GENERAL NERVOUS DEBILITY.

Prof. M—— of Ann Arbor College, Michigan, was first treated by Mrs. French in July of last year. For nearly a month little if any benefit was experienced, and he was almost despairing and on the point of giving up treatment. Induced to try a little longer, he began to experience relief; hope revived, he purchased a battery, got full instructions for treatment, returned to Ann Arbor and followed up his treatment regularly. From a letter addressed to Mrs. French, and dated Ann Arbor, March 17, 1875, the following extract is taken: "My health has improved so much and so constantly since the beginning of the year that I have felt full of gratitude to God, to you and to the one who directed me to you. I have grown continually more strong and more heavy. I have increased in weight since September of last year from one hundred and

twenty-four to one hundred and forty-seven and a half pounds. Have slept soundly in general, and been able to do heavy work with less and less of fatigue. I dare not think as yet of giving up the use of electricity, and I continue to use it twice a day according to your directions.

DR. FOSTER OF KALAMAZOO, MICHIGAN, WRITES TO MRS. DR. KENT OF CHICAGO IN NOVEMBER, 1874.

"DEAR MADAM: In reply to your request of my opinion touching Electrical Therapeutics as taught and practiced by Prof. Elizabeth J. French and her daughter by means of Electro-Cranial Diagnosis, I have simply to say that it is one of the *grandest discoveries* of the age, and is bound to revolutionize medical practice in its most essential departments. Its cures are marvelous. In cases of tumors it has displaced the knife and healed with a kindly healing. But it is unnecessary to detail. You may rest assured that this branch of medical science is no uncertain thing. Its pretensions are true, and can be well established by resulting facts. I know whereof I speak, for I am in possession of the methods of diagnosing and treating. I think, for the cause of humanity, every medical man and woman should embrace the opportunity of adding to their knowledge the science and practice of Electric Therapeutics, not for the purpose of laying aside entirely the administration of medicine, but to use it when found to be a helpmeet to electrical action. I therefore commend Electrical Therapeutics most ear-

nestly to you. 'Learn us and try us' can be their fearless motto.

"C. A. FOSTER, M. D., LL.D."

The writer of the above has had, and is now having, some marvelous results.

The lady here referred to has studied the system, and is now practicing very successfully at Chicago, Illinois.

Are cures made by this system of electric treatments permanent?

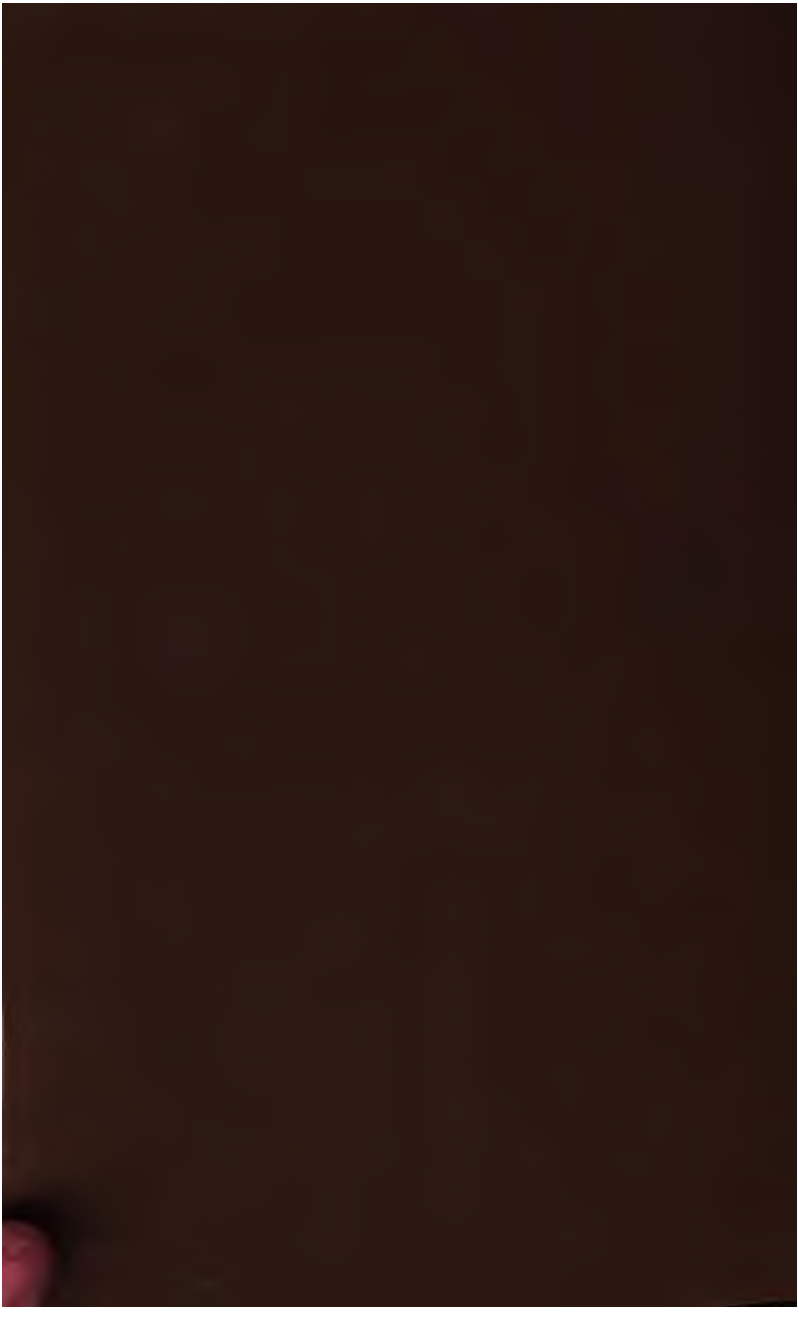
Mr. H. W. Phillips of Wheeling, West Virginia, whose testimony in reference to his blind daughter who was treated in 1869 will be found on page 225 of this book, writes in reply to inquiries made by Mrs. M. N. Halsey of Adrian, Michigan, under date October 2, 1874: "Our daughter's eyes are now sound and well, and have been for some time. We give Dr. Elizabeth J. French all the credit of restoring her sight and making a radical cure. Mrs. French cured a number of persons in this city of various diseases, all of whom, so far as I know, are permanently well. I think you can safely trust your daughter in her hands."

Col. W. A. Fox of Buffalo wrote a few weeks since to a lady in Rochester, New York: "Many years ago I was carried to Dr. Elizabeth J. French's house in the city of New York while suffering from a very severe attack of inflammatory rheumatism. My limbs were all drawn up; the act of walking was simply impossible, and the slightest movements were attended with

excruciating pain. I was treated by her, and under her directions, electrically both in connection with and independent of the electro vapor-bath, and in fifteen days I was radically cured, and have enjoyed excellent health ever since. By all means place yourself under her care."

A gentleman of prominent position in Philadelphia writes under a recent date to a lady: "I cheerfully respond to your note; you can with confidence submit your daughter to Mrs. French. Our daughter from childhood was afflicted with a weak back, indigestion, neuralgia in the back of the head, etc. We had tried a number of remedies, sea-voyages, etc., without benefit. We also employed electro-doctors without good results. We were induced to try Mrs. French through the recommendation of —— and of Prof ——. Our daughter enjoys better health now than she has during her whole life."

Hundreds of cases extending over a period of many years might be referred to, were it deemed necessary, in evidence of the positive and continued relief resulting from this mode of electric treatments.



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